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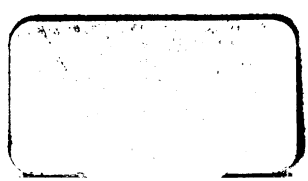

SHARPSHOOTING

For

Sport and War

SHARPSHOOTING

For

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Sharpshooting

For Sport and War

William Worlington

BY

W. W. GREENER

AUTHOR OF
'THE GUN AND ITS DEVELOPMENT,'
'THE BREECH-LOADER AND HOW TO USE IT,'
'MODERN SHOT GUNS,' ETC., ETC.

With an Introduction by Wirt Gerrare

FULLY ILLUSTRATED

London
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PREFACE

RIFLE-SHOOTING is to-day the subject of supreme importance to every Briton, for only by general proficiency in the use of the best weapon can the Empire be maintained, and the national safety secured. I am convinced that every able-bodied man who is willing to learn and practise may become an efficient marksman. In so far as the art of shooting with the rifle can be taught by words, I have essayed to make all who read this treatise proficient sharpshooters; more, I have endeavoured to impress upon all that efficiency, so easily and pleasantly acquirable in leisure hours, is absolutely indispensable if British supremacy is to be sustained. I have written plainly, that all may understand even such technical matters as must be included in works of this kind. M. Wirt Gerrare, than whom no one, probably, is so well acquainted with the literature of firearms and shooting, has contributed an introductory chapter pointing out the part the armed

civilian has played in past history, the progress made in the use of firearms, and its practical bearing at the present time, when it is clear that the weapon makes the soldier.

From long connection with firearms and intercourse with the foremost users of them, I am convinced that anyone can become an efficient marksman. The object of this book is to supply such information respecting the rifle and its uses as may induce those accustomed to the shot-gun to obtain sport and recreation from an arm of greater precision; to direct those who do not shoot at all to the practice of the most interesting amusement the century offers; and to help the experienced shot to a fuller appreciation of the most scientific weapon of any age.

W. W. GREENER.

BIRMINGHAM,
10*th February* 1900.

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'High courage, sound health, power of endurance, discipline, organisation and leading—under the existing conditions of war all become more or less subservient to marksmanship at the supreme moment of actual conflict with the enemy.'

Field-Marshal Lord ROBERTS.

'Unless men learn to shoot the weapons in their hands with accuracy, they might as well be armed with inferior weapons.'

Captain A. G. FOULKES, M.A.

'If the youth of England *could* use the rifle, the strength and power of the United Kingdom would be invincible.'

Sir HENRY HALFORD.

'The perfection of the rifle, and skill in its use, make a mighty nation.'

A. C. GOULD.

'It is the weapon that makes the soldier.'

WIRT GERRARE.

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INTRODUCTION

BY

WIRT GERRARE

To a small elementary work on the acquisition of the art of 'Sharpshooting' with the rifle I have been asked to point out, in an introductory preface, the part the armed civilian has played in the past history, and indicate his worth to the community to-day. Many volumes have been compiled on the subject, but have not exhausted its interest. The space at my disposal being inadequate, I am necessarily brief.

To begin at the beginning, the use of weapons appears to have been known to all primitive peoples and barbarians, except the Harvey Islanders, and practice with arms common to all. The first general distinction was sex; the first non-fighting 'caste' that of the priesthood. Generally, among all races, at all times, whoever could bear arms was expected to do so, at need required so to do; but the service exacted was

neither continuous nor permanent. Among even the most warlike races the object of war was to secure peace. Quite early in the history of civilisation it was sought by means of a standing army to obtain general immunity from active service. Seostris, who flourished in Egypt about the sixteenth century B.C., made picked warriors into a military caste, gave lands for the support of themselves and their families, and from among them took a force with which he overran Asia from the Caspian Sea to the river Ganges. Next Persia formed a standing army, and with it invaded Greece, defended by a Militia force. Philip of Macedon, father of Alexander the Great, was the next to form a standing army; with it his son conquered the known world, but on its return to Greece after his death it was disbanded. In the second century B.C., in Rome everyone between the ages of seventeen and forty-six was liable to be called upon to fight; but as long as service in a legion was restricted to freemen, it was counted an honour to be chosen. The war over, the weapons were returned to the State armoury, and the soldiers went to their former avocations. The character of the Roman army fell when it became necessary to enlist slaves and mercenaries in order to satisfy the ambition of leaders for foreign conquest. Among the Gauls, Britons, Teutons and Scandi-

navians the nation was the army. Every freeman bore arms as a duty and privilege. The rulers had absolute sway in times of war; in times of peace the nation resumed the authority. To those who won the war the lands of the conquered were given. With possession there was the implied obligation of further service in order to defend with the sword what had been won with the sword—hence the feodal system arose. In Anglo-Saxon times there was the *fyrd* of freemen for the defence of the kingdom against invaders; but after the Norman Conquest and the imposition of the feodal system, forced levies, though illegal, were common from the days of Edward III. to Elizabeth.

The British standing army appears to have originated from the Scotch custom introduced by James I. In the reign of his unfortunate son there came from the people the 'Petition of Rights' against martial law being imposed upon subjects of the King in times of peace. It was resented by the Crown, and Charles tried to develop the 'trained bands' James had enrolled. In the struggle that followed, these for the most part sided with the Parliamentarians against the Crown; but Cromwell's magnificent standing army of 80,000 men was composed largely of provincial yeomen—the finest force England ever had. After

the Restoration, the old Dumbarton regiment became recognised as a permanent addition to the King's forces. It is said to be the oldest regiment in the world, originating in the ninth century as the Bodyguard of Charles of France—which of the three, 'the Bald,' 'the Fat' or 'the Simple,' I know not; it later became a royal regiment of foot, then 'The Royal Scots,' and is now the Lothian territorial regiment. By the 'Declaration of Rights,' accepted by William III., the Crown may not raise any army without the consent of Parliament.

Volunteer forces, as opposed to levies, long ante-date the Victorian age. In England, the oldest existing corps is the Honourable Artillery Company of London, which was founded in 1537, chartered by Henry VIII., and restored to its old privileges in 1610. The patent was for creating a 'Fraternity of Artillery of Long-bows, Cross-bows and Hand-guns.' It was employed to protect the Bank of England during the Gordon Riots in 1780, and until 1849 appointed its own officers. It consists now of a battery of artillery, a troop of cavalry, six companies of infantry, and a corps of veterans, and alone of all Volunteer regiments may march through the streets with bayonets fixed. Volunteer regiments served in the American War, 1778; in 1779 a Volunteer force 20,000

strong mustered in Dublin to support the Earl of Leinster and Free Trade. In 1782 it was suggested by the Earl of Selborne that Volunteers should be enrolled; in 1794 some corps were raised, and five years later some 8000 were reviewed by George III. The threatened invasion by Napoleon led to the increase of the Volunteer army; the Yeomanry was then established; but after the fear of invasion subsided, the forces were disbanded in 1814, being replaced by the local Militia, more directly under Government control. For purely political reasons the movement was discountenanced and discouraged; from motives of patriotism alone it was kept alive by Rifle Clubs in all parts of the country. In 1837 another attempt was made to obtain Crown recognition, but Lord Melbourne was opposed to arms being in the hands of the people. So matters went on; a deaf ear was turned to all entreaties of the patriots, until, in 1859, in a time of panic, Lord Peel's Government decided that if a corps would at its own expense provide its equipment and instructors, then, when efficient, the Government might avail itself of its services if at any time there was need for them. The expectation was that, from the Rifle Clubs and those fond of sport, a few thousand sharpshooters might come forward, who would be useful to harass an

enemy, and a 'Green Book' was prepared containing the 'Regulations' for such a force. Before it could be issued, the response had been so earnest that 100,000 men were enrolled, and the following year the Queen reviewed in Hyde Park, and Queen's Park, Edinburgh, some 80,000 men of the new force—men who were able to manœuvre and shoot. The old Rifle Clubs became a part of the new organisation. The Duke of Cumberland's Sharpshooters, founded in the reign of George III., became the Victoria Rifles, now the 1st Middlesex; the Hanover Park Club, the Liverpool Club, the Exeter and Devon Rifles, among others, all became crack regiments in the new Rifle Corps. From the first Her Gracious Majesty and the Royal Family have been its most beneficent patrons; the National Rifle Association the stern nurse of its efficiency; the State its hard-hearted step-mother, and the War Office its niggardly uncle. Times have changed, but its loyalty has been unswerving; it has always been at hand, ready to serve, if needed. The idle and rich fell away; money-seekers grudged their time; merchants sent their clerks, traders their shopkeepers—these and artisans are now the backbone of the force upon which England looks with pride in the hour of emergency. It is grievous that those who can least afford the time and money

should alone bear the burden of military duty; shameful that those who could become efficient with modern weapons should escape by reason of their 'respectability.'

In theory the professional soldier is the superior of the armed civilian; history makes no such distinction. The Scotch, like the Irish, love fighting for fighting's sake; no braver or better skilled men ever lived than the Scotch mercenaries of the Dugald Dalgetty type who swarmed over Europe in the Middle Ages. They were in all armies—French, German, Swedish, Polish or Russian; to them it was all the same if the pay was good. To some extent they doubtless raised the standard of the fighting, but they left no decided mark of their prowess, possibly because, as some were on each opposing side, they neutralised each other. Yet English yeoman beat them and their like at Dunbar, Prestonpans and elsewhere. In turn, the English enlisted German mercenaries against the Americans in the war of 1812, but the Colonists made short work of these. On a larger scale, Marathon, Mykale and Platæa were won by armed citizens against a professional invading army; the Carthaginians, who employed immense numbers of mercenaries, when these rose against them, utterly defeated them. The Roman citizens beat Carthaginians and mercenaries together. At Mor-

garten the Swiss peasants, vastly inferior in point of numbers, utterly routed the most brilliant and dashing troops the Austrians could produce; a century and a half later the powerful and courageous Burgundians, with the flower of French chivalry led by Charles the Bold, were utterly crushed by the peasant mountaineers. During the present century, Andreas Hofer, who fought against Ney, instigated the Tyrolean peasants to rise against their conquerors. In 1809, at the head of a small force, he twice defeated the Bavarians, won Eckmuhl and Ratisbon; captured Innsbruck, and drove the enemy out of the Tyrol. Then 40,000 French invaded the country, but in eight days Hofer won a battle against Lefebure and recaptured the town. In 1612 the Russian moujiks took up arms, drove the Poles from Moscow, and defeated the foreign armies opposed to them; in 1812 the Russian peasants wore out the retreating *Grande Armée* long before it reached the Beresina. Wellington, with the rawest of raw levies, won Waterloo against an army of experienced soldiers. Granted, then, that the rank and file may be inexperienced and unprofessional, must the leaders be of military caste and training? Not necessarily. Jacob of Artevelde was a brewer; Oliver Cromwell said to be one; Kosma Minin, the Russian

patriot, a butcher; Joan of Arc, a shepherdess; Hofer, an innkeeper; Joubert, a Boer farmer.

From the purely professional standpoint war should be waged according to rule, and when the contestants are about equal in strength, and both observe the rules and usages of war, battles are apt to degenerate into mere games. In the old days the order of fighting was for kings to engage only kings, knights to meet knights, pikemen, pikemen—all in turn. Even to-day an engagement begins with artillery fire; then it is allowable for the infantry to advance. After the battle is won cavalry may charge into the routed enemy —in fact, there is still the old order of letting each arm have an opportunity to distinguish itself, sometimes, possibly, with less regard to the efficacy of the act than there should be. One result of this adherence to tradition, or text-book, is to give to the contestant who will not observe the recognised practice a distinct advantage. At Morat the knights had to fight with infantry—they were annihilated. The peasants were armed with guns, which made them superior in fighting strength to the knights. It is the weapon makes the soldier. English bowmen beat the French knights, swordsmen and halberdiers. Then the defeated French sought aid of smiths and chemists, and, having furnished themselves

with superior artillery, a maid led them to victory against the same enemies. Church and State sacrificed this leader to the enemy, but held to the weapons, with which they continued to drive the enemy back. This superior armament was due to the people, not to professional warmongers —such opposed the introduction of new weapons. And that spirit lasted long. Wellington, so great his affection for the old musket with which he won his battles, forbade rearmament with a better type, and the antiquated flint-lock 'Brown Bess' was actually manufactured for use during the Crimean War! The known antipathy of the warrior class to improved arms was utilised by the mediæval towns to their own advantage. The mere possession of a big gun kept predatory knights, and leagues of knights, from encroaching upon the rights and territories of the free burghers. Moreover, the towns, by reason of greater wealth, and the exercise of greater craft, kept their foes at bay until they could triumph over them. The unusual is the dread of the schooled soldier. Even Frederick the Great and his disciplined troops were upset by unknown and unexpected onslaughts in primitive fashion. Napoleon could not defeat an army that continuously ran away from him—though, doubtless, he had heard of the Parthians. Warcraft com-

prises much more than tactics, strategy and discipline. All that is included in the science may never be known, but the principle is the same always—to make the most of every resource.

A small standing army of high efficiency, although immediately successful, has always, in time, been defeated by a warlike race rising in mass against it. No nation of aught but fighting men constantly engaged in war could long endure. Even the Vikings, having conquered a suitable country, allowed their ships to rot on the beach, and the erstwhile warriors betook themselves to trade, crafts, and even agriculture. In 1798 by compulsory service it was thought to make France an all-powerful nation; instead, it merely put into the hands of a military adventurer a whip of scorpions with which he scourged Europe, and Europe in the end crushed both him and his weapon completely. The next development was to use compulsory service in order to raise a large army, in which all in turn should serve, and be supported by those who had to pass through the ranks or had already done so. The weakness of this principle is the reduction of all units to a dead level of mediocrity—to imbue the nation with that conservatism which is inherent to militarism; to deprive men of the power of initiative and the quality of elasticity which

individual independence alone assures. Nevertheless, the existence of such armies is felt to be a lasting menace, since never yet has a large standing force been long maintained without waging a war of conquest. In these days of improved transport by land and sea, it will not be upon the nearest, but upon the richest power, that the attack will be made as soon as the pinch of poverty is felt.

If history teaches one thing with greater certainty than another, it is that the conquest of a warlike nation is of all tasks the most difficult to achieve. Just as surely as if you scratch a Russian you find a Tartar, so if you strip the Briton of his veneer of civilisation you have a warrior. When any of our race are engaged in war each one of us not at the front criticises the actions of those who are there—the fighting spirit has not to be inculcated, only directed.

But the desire for fighting and ability to conquer are very different things—mere bravery our vanquished foes have possessed equally with ourselves, they lacked our weapons. Among possible future enemies are armies equally well, if not better, armed. In this particular then we must still strive for superiority, but having attained it, not proclaim the fact on the house-tops, but maintain the lead at any cost. In this connection

I should like to see a team chosen from the regular army—equipped by the Royal Laboratory and Government establishments—challenging the competition of private factories and the Volunteers in an all-comers' contest at Bisley each year.

With the development of arms of precision which will kill at a distance, ability to use them has placed the feeble on a level with the strong. In war, craft and cunning are worth more than physical strength and personal bravery—it is the weapon gives the victory. In a life and death struggle numbers are of less importance than individual intelligence — from the action of a huge machine, such as a modern army is, each man must escape as best he can and injure as he is best able.

If large standing armies are a menace, adequate steps for self-protection need threaten none, and a civilian army may include the whole nation and yet, probably will, be peaceably disposed. By all means then let the best weapon be at the command of whomsoever will undertake to accustom himself to its proper use, and let all be encouraged to do so. The 'master-shot' was formerly honoured among all nations, and ought now to be so. Is not that legend we know best as the story of William Tell common to all Aryan races; and not to them alone, but to Turks, Mongols,

Samoyeds, and many others? Let each one of us take its teaching to heart, and never forget what it may be necessary for all to do in order to ensure personal freedom. Honour the citizen who becomes a good shot; regard one who fails to make himself efficient with as little respect as felt for the man incapable of sitting upon a common jury. By no means neglect to instruct the young. Teach all to shoot. By learning that, one may some day save not only his own life but the integrity of the nation—such knowledge may be of greater use to him, and us, than ability to work sums.

As for the army, the work done on the parade ground appears to be of as little use in actual warfare as ability to wield the quarter-staff. Front rank men should be chosen not because of their inches but by their ability to injure the enemy. We want less of the drum-major and more of the musketry instructor. An enemy cares as little for extension exercises as for a hauberk of mail, and company evolutions are about as impressive and useful in these days as the swinging stride of the Macedonian phalanx would be. The enemy armed with a good rifle would be as little dismayed by one as by an other. No scheme of army reorganisation will be thorough unless it substitutes sight white

for pipeclay, and pays greater regard to the blacking of the back-sights than of boots. There must be less throwing out of the chest and greater care of the eyesight; less insistence upon military discipline and warmer encouragement of individual intelligence among the fighting units; and, among officers, let the filling of their own ambulance waggons be a bar to promotion.

Best of all, let everyone not only become an efficient shot, but take such an interest in shooting and affairs military as will ensure the British Empire having the deadliest and best-equipped army the world has ever known.

SHARPSHOOTING

FOR SPORT AND WAR

CHAPTER I

A PRACTICAL POLICY

Now, as always, the strength of a State is represented by the ability and willingness of the individuals composing it to protect themselves and secure the common weal. In more primitive times it was customary for all to bear arms who were able to use them; the civilisation of to-day requires proficiency with weapons as the first duty of a citizen, since it is indisputable that this duty may not be deputed without loss to the community. The importance of rifle-shooting as a general practice cannot well be over-estimated, the rifle now being what the bow once was—the weapon with which battles are won.

Rifle-shooting is the question of the hour, of the day, of to-morrow, and every day after to-morrow; its practice must be insisted upon even after the existing excitement as to national defence has subsided.

How this will be accomplished it is not easy to foretell; either of two diverse policies may be followed. The first, possibly the most probable, is the adoption of some modified form of conscription. By some such means as continental powers have employed the numerical strength of the British army may be increased; but it is not by imitating the methods of European nations that we can surpass them.

Compulsory military service is incompatible with such freedom as the English have hitherto enjoyed; its introduction would be resented. The many excellent citizens — public-spirited, peace-loving, philanthropic men—who have conscientious objections to war, would be subjected to martyrdom and persecutions, even as in those countries where the iron hand of the military despot enforces equal treatment for all. More than the mere perfunctory performance of an unpleasant duty is required of those who would become sharpshooters with the rifle. A man may be taken to the butts and made to shoot, but no power on earth can make of him a marksman if he has no mind to become one.

Luckily rulers are aware of the fact that more can be done by rewarding laudable efforts than by penalising inactivity.

The worth of the English long-bow could not be furthered by those Acts of Parliament which forbade the use of better weapons, and exacted penalties from those who failed to become proficient archers. But when shooting with the long-bow was the chief pastime of the people, then was archery rightly regarded as the

strength of the nation and the safeguard of its freedom. If only the taste for rifle-shooting can be encouraged until practice at the butts becomes the favourite pastime, most able men, if not all, will, as fighting units, be the equal of the trained soldier; then a national brotherhood in arms may be established by rightly using that spirit of emulation in such friendly competition as infuses life into all popular games and sports.

The British are a nation of athletes; they must become a race of sharpshooters. Physical strength counts for little against a civilised foe, in comparison with the intelligent use of modern weapons. The men armed with the best the resources of invention can supply care neither for spears nor assegais, and know how to avoid even the British bayonet. In the coming great struggle for world supremacy, victory will be to that race whose fighting units are best armed and know best how to make the most of their superiority. As will later be proved, the rifle is the king of weapons for the individual soldier, and in its use the average man can easily become more expert than the ordinary linesman of the British or any European army. At present no one knows what could be accomplished with an army of ten thousand men, each of whom, as a rifle shot, could equal the average performance of the Bisley competitors. Even with existing weapons and conditions it would practically treble the range at which infantry fire is counted effective.

Such a corps would be a new tool for the Commander-in-Chief, and collectively, to one who knew how to use

it, a weapon of the greatest efficiency, more especially for home defence.

The ideal corps would be composed of sharpshooters chosen as being the best from all in the nation. To ascertain who these may be is impossible until rifle-shooting is as generally practised as cricket, and its competitions found as interesting as football. How that is to be accomplished all animated by even a spark of patriotism must wish to know. It was the original aim of the National Rifle Association, but this the Society, after thirty years of vigorous work, has failed to achieve. Of its excellent work in other directions, of its successes in connection with the Volunteer forces and the improvement in the shooting of the regular infantry that resulted therefrom, some particulars are given elsewhere, but it has signally and completely failed to make the practice of rifle-shooting in any sense a national pastime. But the failure is not due to the faults of the Association; rather to the inherent apathy of the public, to the restrictions imposed by law, to the predominance of professional militarism, to conditions which members of the Association, their friends and supporters have been powerless to control. Notwithstanding its failure in this particular, it must be conceded that so far as marksmanship with the rifle has improved—in the army or outside—it is wholly due to the National Rifle Association.

One very necessary step is that instruction in shooting should be made a compulsory subject in all the public elementary schools for boys. As will be shown later,

no better practice can be found for that education of the eye and hand which forms the basis of all practical instruction in handicrafts.

Moreover, boys from the ages of eleven to the time of leaving school—an age it is proposed to extend—are not only most likely to take a lively interest in the necessary aiming and firing drill—which all who would become expert must practise—but they are then best able to profit to the full extent by such instruction as can be imparted. Those who subsequently enter the regular army would have acquired some skill in the handling and use of the commonest form of military weapon, and would, consequently, the more quickly learn whatever might be needed to make them expert shots. None would ever quite forget all that they had learned as boys. If ever called upon to take a rifle for the defence of their country, they would do so with greater confidence than many of the short service men who enter and quit the ranks in their early manhood.

The expense necessary to fitting every boy to become useful to the State as its defender—in short, to learn his first duty as a citizen—would be grudged by no one; and to practical worth in after life the acquisition of some of the ornamental graces now taught may be sacrificed without a pang to any, and to the advantage of all.

It is not proposed to make boys proficient marksmen with the service rifle. In my opinion such elementary instruction as is absolutely necessary could be given

in a gallery range formed in any school ground. Cadet or 'miniature' rifles alone used, consequently the ammunition would be comparatively inexpensive. The main thing is that boys should become accustomed to handle rifles with safety to themselves and their associates; that they shall learn to hold it with the same confidence that most persons do when using a cricket bat; that they shall accustom themselves early to the right position for shooting; shall learn to 'pull off' without pulling 'away' from the mark, and learn to take the same amount of foresight, and to shoot straight and with uniform results at short ranges. That is all. With some the practice might be continued later. For instance, the 'Boys' Brigades,' when camping out in the summer, might hire a few serviceable 'cadet' rifles for the term, and at improvised butts obtain some useful open-air practice. Turns could be taken at the firing-point, where alone the ammunition would be served out to each competitor, shot for shot, much as is done at the competitions of the National Rifle Association.

Early instruction in shooting is insufficient, though markmanship, like swimming, once learned, is never forgotten. The State must provide ample facilities for further practice, and expert instruction for those who desire to increase and maintain their efficiency. It follows that the annual tax for a gun licence must be abolished, and everyone, whether an enrolled Volunteer or not, be entitled to carry a rifle, providing that each year he prove his efficiency as a marksman by

performance at different distances on some public range.

The question of game laws is in no way raised; for the killing of game, for rabbits and wild birds too, if desired, a licence would still be required. For the practice of the one sport that is conducive to converting the civilian into a soldier no licence should be required, but, on the contrary, such opportunities given for its enjoyment as may be possible, and efficiency rewarded by such lightening of the citizen's burden in other ways as the needs of the State permit.

To enter into the purely political aspects of the question would be quite out of place here, but two points appear worth stating in general terms. The first is, that the men who neglect, or shirk, a duty to the State, not only benefit to the extent of having that work done for them by others more generous, but are also free to turn the time so saved into money; and the second is, that the performance of the duties of common citizenship together tends to break down those artificial barriers of class distinction, and so serves to knit the social fabric more closely together. To become an efficient Volunteer and maintain that efficiency cannot cost the individual less than £10 a year, consequently a rebate of sixpence in the pound, with respect to £200 yearly income, should be allowed all efficient Volunteers from the income tax assessment of those whose income is £1000 or less, and one penny in the pound from the gross income of all those assessed at more than £1000, and a pro-

portionate substantial reduction in favour of those who have served a term of years and subsequently maintain their efficiency as marksmen. This would certainly penalise those too busily engaged in amassing wealth to render a minimum service to the community. Those persons who are not assessed at all for income tax will probably in the near future benefit by a State-aided old age pension fund, those of them who give voluntarily of their manhood to the public service should be treated with greater liberality, and this clause made retrospective in order that those who have acted without hope of reward may directly benefit.

CHAPTER II

THE SPORT OF RIFLE-SHOOTING

CHIEF among the reasons for the indifference of the masses to rifle-shooting must be counted their ignorance of its value as a means to sport and recreation. To most it is associated with military service and practice. In times of national peril, when people are roused to a sense of their duty towards the State, some hurry to acquire in a few hours what it takes many years to learn thoroughly, whilst others still defer to some to-morrow the practice they cannot begin too early. Ordinarily such games as the social lawn-tennis or the solitary golf satisfy the general desire for sport combined with exercise. It is true that, apart from the facilities accorded to one as a Volunteer, there are few opportunities for any of the general public to gratify a liking for shooting with the rifle, and none for the acquisition of a taste for the sport solely as sport. Even the Volunteers have insufficient range accommodation. During the past ten years more than 530 ranges have been peremptorily closed, and only 200 new ones opened. But this must be remedied—and soon.

Apart from the Volunteers, there are some quarter of a million and more men who yearly take out licences to shoot, and may be regarded as possessing some

BRITISH RIFLEMAN ABOUT 1800.

general idea of the uses to which firearms may be put. Of them very few ever pull the trigger of a rifle; fewer still use the weapon for target purposes, or, beyond

shooting game with it occasionally, derive any pleasure from its possession. To these licence-holders this chapter will most directly and immediately appeal.

Among these sportsmen very possibly there is an erroneous impression current to the effect that because an expert target shot is not necessarily a good shot at game, practice at fixed marks is detrimental to success in the field. This is not so. More probably the reverse is true, and that ability to hit the mark at known distances is essential to clever and steady shooting at game. In any case, 'snap-shooting'—the hitting of moving objects is a plus, not a minus, quantity; the preliminary education necessary to becoming a good shot with any rifle is the same, and directed towards enabling the shooter to hit the object at which he aims, and this, for early attempts, must be a stationary one. The close season for game is the spring and summer, when the weather is that best suited for pleasant target practice with the rifle. To those who are attracted to shooting chiefly because of the opportunities it affords for marksmanship, these months of idleness need never be dull and useless; but, if a rifle be substituted for the shot-gun, marksmen will find a new pleasure, and one which will prove an unfailing source of intense enjoyment.

The game shot, like the man who does not shoot at all, is apt to conclude that target shooting is a tame and uninteresting pastime, lacking every essential which a popular sport should possess, and particularly the direct competition of a fellow-sportsman in friendly

rivalry for first prowess. Nor is the general prevalence of this opinion surprising, if, as is very probable, a keenly-contested match between expert riflemen has never been seen, or is based upon a casual visit to Bisley during the annual meeting of the National Rifle Association. Than this last, nothing can be imagined more likely to disgust the non-rifleman with shooting as sport. In the first place, their camp is not easily accessible; the journey thither will probably determine the visitor never to attempt the like again, and the return journey as certainly confirm that resolution. The writer has never had the luck to reach Bisley by the 'Brookwood Special' from Waterloo in less than an hour; or to make the run home without tiresome waits at Woking and elsewhere. Then the air of the camp is military, and to the ordinary civilian this is almost hateful. In the broiling sun it is difficult to find shade, or avoid clouds of dust; in a pouring rain it is as hard to find shelter, and impossible to escape the mud. If he has the luck to be entertained by members or contestants, he will have no cause to lament the cheer, but would more gladly accept the same hospitality in a town mansion or on a house-boat by the river bank. Bisley is no place for picnics; business is meant and work is done—so much, and no more may be said for it. As for the contests, they are simply perplexing by their multitude. The complex method of scoring, the inability of the stranger to find out what is going on, to know who is winning, who losing, and what it is all about, drives him to feign

interest in the technical side shows, and simulate astonishment at mechanical contrivances of which he knows nothing. A long line of men prone before an equally long line of targets, five hundred, or maybe a thousand, yards before them; two men, if not more, firing in turn at each target; an incomprehensible signal shown after each shot, and the firing continued hour after hour, the men only retiring after a certain number of rounds have been fired, in order to make room for others, who in turn do the same. The why and wherefore of it all the stranger cannot understand, and becomes easily and quickly wearied of what he sees and hears. If by chance he happens on the moving targets—the running deer, etc.—he can at least learn, if he cannot see, whether the shot fired has been a hit or a miss; but though two equally good shots are in apparent contest, and firing shot after shot with zeal, determination and success, the probability is that neither of them know whether they have won anything by their efforts, and the stranger is never likely to know—nor, after a brief interval, to care in the least. Happening on the long range firing-point, he will find no difference between the practice there and at other butts; save, perhaps, that the contestants are more leisurely, methodical, and seemingly less in earnest. If the visitor, in addition to being ignorant of rifle-shooting, is also an utter stranger, and unable to strike up early acquaintance with an intelligent and, for the time being, disengaged competitor, he will not only fail to learn anything of rifle-shooting, but become quickly and

thoroughly disgusted with the whole business. At first he may simply wish that he had come down only to the prize distribution; but the ceaseless rattle of the rifles, the lack of interest about everything will soon decide him to hie home again. On his way back he may wonder whether the half-crown he paid for his ticket, or the cash he exchanged for refreshments be the worst possible investment; but will always be fully convinced that nothing shall ever persuade him to go near the place again.

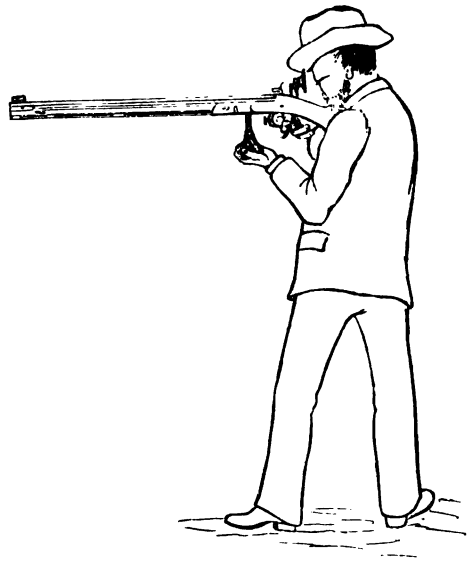
It is most unfortunate that a visit to the great meeting of the Society whose one object is to encourage rifle-shooting, should have such an opposite effect, but it is difficult to see how it can, with existing conditions, be remedied. Bisley is no place for the stranger or the beginner, but only likely to benefit those already enamoured of rifle-shooting. A man ignorant of billiards first introduced to a knowledge of the game by being taken into a great room where, simultaneously at a dozen tables, men are seen playing the French game and the English, some amusing themselves with pyramids and others with snooker pool, is most likely to be so confused that he will deny that such a game can possess that powerful fascination it has for most men. So a visit to Bisley fails to make clear the attractions of rifle-shooting. If rifle-shooting is to become generally popular with 'the man in the street,' one of two things should be done at Bisley. Either the general public should be refused admission, except on the day of the prize distribution, or butts

should be set apart for the use of those 'all comers' who are not Volunteers or entered contestants for *any* of the scheduled competitions. Let rack rifles be provided, diverse targets be used, and the butt made as attractive as it is possible to make it; then perhaps such interest as the passing public have in rifle-shooting will be manifested.

Target shooting is the most exciting of sports to those who understand it. Let us take another glance at the same Bisley meeting, but not now as a casual visitor but as an interested one. The time towards sunset, butts the same, six hundred yards range, with the interminable firing line. The contest the same, one section of the competition for 'The Queen's.' A number of men who have scored the same points have to struggle for the one place vacant among the hundred to whom the last stage is restricted. The men get down and the contest begins. After firing three rounds some of the men get up and walk away—they are already 'out of it.' This re-occurs after the next round, and the next, until the line has but three men after the seventh round has been fired. All three have made bull's-eyes, and must 'shoot off' for the coveted place. One is in the distinctive uniform of a crack metropolitan corps, another wears the scarlet tunic of a line regiment, the third, the unobtrusive green of a lowland Scot. Two are not far from each other, the third remains right away at the far end of the now deserted line. They fire; again bull's-eyes are signalled to all. They know that the competition is narrowed to few, perhaps do not care to

count how many, wishing to remain unaware of everything that may distract attention from the target and the weather conditions. They do not fire exactly in turn; but after the ninth shot, an inner is signalled to one, and he retires. The other two put shot after shot into the bull's-eye, and the bystanders, in breathless expectation, wonder whether or not the record is to be broken. The casual observer would think that two good shots, having done the thing so often, can continue until tired out. The expert knows better. He wonders who will first break down, and why. As for the contestants, they are determined, mayhap excited, but not showing any sign of that; struggling to repress the thing itself, since it is fatal to marksmanship. They continue; each shot means to them another chance for securing the coveted prize; or to lose it, this year for certain, probably for ever. But on each shot all through the earlier stages as much has depended; more seems to hang upon each issue now because the guerdon appears to be nearer. The scene is as fateful as the supreme dramatic moment in an ancient tragedy; the struggle really as fierce as any mortal combat fought in the Roman amphitheatre, but on a higher plane. In this contest it is not mere brute strength, nor yet skill alone which will decide the issue. Skill there must be, the knowledge that is power, and strength in that form which is ability to persist and endure; an advantage in any one of these qualities does not mean success, for in this struggle intelligence is pitted against intelligence, and so the interest is raised; but beyond all, there is the

possibility of luck ruthlessly intervening to defeat the best man in the end. Know this, to understand rifle-shooting—and be thrilled as once more the rifle rings out. As the dummy rises from the pit, the shooter sees the black panel on the left lower side, and his heart sinks within him. His competitor has to fire, and it is



METHOD OF HOLDING RIFLE AND POSITION OF SWISS RIFLE SHOT.

not without a tremor he sees that target disappear. But fortune is not yet interfering with skill. That shot, too, was an inner, and both competitors are still equal; some change of light unnoticed by both caused a faulty aim to be taken. The spectators are pleased, and with

a sigh of relief concentrate their attention upon the man who has first to fire. Will he succeed in 'finding the bull' next time? None hurry him; he looks long through his binoculars at the spotting disc which indicates where exactly on the target the wandering bullet struck. The cartridge handed him for the next shot lies unheeded by his side. Where the other man's shot struck is what he most wishes to know; since that may help him to attribute his failure to the right cause—maybe a flaw in the wind, perchance a too fine sight, even the increased fouling in the barrel of his rifle, which he may not clean. Another try; he recovers the 'bull,' so does his opponent; then 'bull' upon 'bull,' until, instead of the expected bull's-eye signal, the competitor sees the dummy rising with the disc on the upper right corner, and the struggle is ended by an error so great that he who made it is convinced that the thousandth chance of fate wrecked his work. So the one rises to receive the hearty congratulations of all; the other to have the even more earnestly-expressed sympathy of every real marksman who has witnessed the shoot—for the like occurrences are in no sense rare at Bisley, and reckoned all in the day's work.

It is such a contest as this which results when Smith invites his neighbour Jones to a match with saloon rifles in the back garden of his suburban villa. The same forces work for and against both parties; there is the same element of chance, which may now and again decide the issue, but is ordinarily absent, leaving the best man to secure the highest score. It is the saving grace

which raises rifle-shooting from the realm of mere skill and science to the loftier sphere of real sport; that elementary beyond-power of luck which sometimes apparently favours one individual at the expense of another, but truly is as blind as proverbial justice and as erratic as the actual administration of law.

Individual prowess is the key to success with the rifle at target practice, and in every form of sport to be had with it; but when used as a weapon in the military fashion, individual skill disappears, and the collective performance of a firing section of 'fighting units' is alone considered. So in the army individual marksmanship, though acknowledged by the donation of a badge, is counted of less importance than an efficient average, and, if there are any sharpshooters in the ranks, the regulations do not provide for their special employment, nor the musketry instructions for the development of their skill. The 'mark' is considered of less importance than adherence to the instructions of the 'section commander' with reference to elevation and the drop of all the bullets within the danger zone. That is to say, by aiming at the feet of the advancing foe, or the mark which represents them, volley after volley is fired, so as to rain the bullets down upon the ground at that point, which 'is more effective in the field than an equal number of shots fired individually.' In short, whereas the experienced target shot, the sharpshooter, becomes self-reliant, independent, confident and accurate through the use of his weapon, the soldier is taught to take his directions and aim from

the section officer, to fire at the word of command and trust to the result of the average performance of the company. 'The fire is to be kept well in hand by the use of the long, shrill whistle,' and '*is an aid to discipline.*' Its effect upon an enemy composed of sharpshooters armed with modern rifles, is simply contemptible, since these could keep such mediocre performers from approaching within any range that would prove really dangerous. The haphazard dropping of bullets is a risk the soldier is ever ready to take; whereas no man has the nerve to remain in an exposed position subject to the fire of but one sharpshooter, who, round after round, sends his bullets nearer and nearer the mark he means to hit, and knows that he can hit. The sharpshooter may be compared to a forest tree, a sturdy oak, able to stand alone; the ordinary soldier to a single stalk in a field of corn, to some extent supporting and protecting those near, but also depending almost entirely upon others for safety in times of stress. The next error of primary importance that is revealed in the practice of the rank and file of the infantry is the marked preference of the authorities for off-hand shooting, a position which is not only the most difficult for steady aiming, but also most dangerously exposes the soldier to the fire of the enemy. Strange to say, it has many apologists amongst writers whose practical experience ought to have convinced them of its great disadvantages. It is a sportsman's position, excellent for snapshooting at driven game and the like, but *not* likely to be of much real service in

the wars of the future between contestants armed with modern weapons.

On the whole, there can be no doubt that individual marksmanship is the one quality in the ordinary soldier which needs to be developed, and that to it all others should be made merely subsidiary. With increased individual skill the effectiveness of the corps will be proportionately enhanced, so this should be the chief factor in arriving at the value of a company, battalion or regiment—even if smartness of appearance has to be sacrificed, and the march past in review order regarded as a secondary accomplishment.

Side by side with the development of the rifle there has been a corresponding improvement in the practice made with it. The greater accuracy obtained has necessitated a change in the conditions of competitions of skill. One way is to diminish the object aimed at; the other is to increase the distance which separates it from the rifle. The first plan, that commonly followed on the Continent, and already general also in the United States, now requires that the bull's-eye of the smallest size readily discernible at the range, be also divided into varying values, the exact centre—which, of course, cannot be seen, only estimated, from the firing point—counting more to the score than other parts. In Great Britain the practice has been to increase the range—the preferable plan, for the reason that a shot who is able to make bull's-eyes at 1000 yards' range and beyond, with like conditions is master of the smaller bull's eyes and centres at shorter ranges. Ability at short ranges

does not give the same command of the target at these long ranges, where greater allowances have to be made for weather conditions. Good sport is to be had either way.

The disparagement of target shooting because of its dissimilarity to actual warfare is foolish. Good eyesight, speedy manipulation, and ability to judge distances correctly may add to the soldier's efficiency, but, as already stated, ability to hit the stationary object is the basis of all marksmanship. To hit moving objects it is necessary not only to hit the mark, but to accurately place the mark; for shooting at the 'running man,' or game, is nothing more than aiming at that spot which intelligence and experience indicate to the shooter is the one at which the object will be when the bullet reaches there. True, the same time cannot be taken in 'sighting' the rifle, but 'speed' in shooting can be acquired by snapping at fixed targets even better than at moving ones, and should be practised before attempting to shoot game.

Game shooting with the rifle more closely resembles war than does any other sport. Large game shooting is best of all, but that is beyond the reach of most. An excellent substitute is to be found in stalking: even stalking rabbits, for, though 'the conies be feeble folk,' yet when out and about they are very wide awake, and more often than not see the man with a gun before he gets within range of them. By all means let anyone who wishes to become expert with the rifle practise with the .250, the .320, or the .360 at rabbits and the

like. From it he will learn much. Should occasion require it, very little practice with the service rifle at longer ranges will then be required to make him as expert at the larger objects as he was on the altogether smaller scale with the miniature rifle. This sport has far greater attractions than practice on the present military lines in volley firing. When rifle-shooting is more general, many ways will be devised for making 'field practice' both interesting and instructive by introducing that sporting element of competition which is at present lacking.

Another objection sometimes raised to the utility of 'Bisley style' refers to the non-military sights and adjuncts employed by competitors. Like the other objections, it will not stand against the evidence to the contrary. The one object of arming a man is to make him equal to others, superior to others, if possible, and if a 'fighting unit,' by means of mechanical devices, *is* able to accomplish more than the man without them, then the end is achieved. The principle is the same, whether you give a man a rifle instead of an assegai, or give him a telescopic sight instead of the plain leaf. So if a pair of spectacles will convert a man who was useless as a soldier into an efficient shot, there is no reason why any contrivance, which will give a contestant the advantage over his foes, should not be used in war. As to what is and what is not advantageous, experiment alone can determine. Each case must be judged solely upon its merits, the only safe rule being that neither rifles nor the shooting of them has yet attained per-

fection; and if limits be imposed, it is only because fairness requires the observance of the usual custom of placing contestants in the same competition upon the same basis.

Rifle-shooting, in any and every form of competition, calls for the exercise of all the qualities that most ennoble a man—determination, self-possession, faith, self-confidence, admiration for the achievements of others. It is a healthy recreation, it takes men out of doors; it is suitable for the elderly, since it makes but a small demand upon muscle; it is the best schooling for the young, as it requires nerve; it interests all, since it allows—indeed, commands—the exercise of the intelligence. To become expert in the use of the long-range rifle, and to know the reason why, is to be a past-master in a difficult art, and learned in lore that of itself is an education. Believe me, there is no pastime the equal of rifle-shooting; rifle-shooting, pure and simple, will satisfy without the adjuncts of bagged game, 'pots' won, or honours received, for the use of the rifle is of itself a sport unequalled.

CHAPTER III

VARIETIES OF THE RIFLE

A RIFLE differs from a smooth-bore gun by having the inside of the barrel grooved; the grooves take a spiral direction, and, when passing through the barrel, the bullet is forced by them to turn upon its own axis. After leaving the muzzle the bullet continues to rotate during its flight, and thus any irregularity of balance it might possess is equalised, and the tendency to depart from a straight line lessened. If instead of a round ball a conical bullet is fired, the resistance of the air tends to make it rotate round its shorter axis; rifling prevents this by causing it to rotate round its longer axis. It follows that the greater the length of the bullet the greater must be the velocity of rotation, consequently the sharper the twist of the rifling.

Rifling was known quite early in the sixteenth century, but, with the muzzle-loading small arms in use, it was almost impossible to get a bullet, fitting the barrel tightly enough to be acted upon by the grooves, down upon the charge of powder—hence the rifle was counted of little real use as a weapon of war. In 1835 the late W. Greener invented the first expanding bullet, which,

STRAIGHT-HAND MARTINI BOOK RIFLE.

PISTOL HAND MARTINI.

MARTINI .303 SERVICE RIFLE.

SPORTING PATTERN MARTINI RIFLE.

as shown in the illustration, was increased in diameter by a taper plug forced into it when the bullet was in position upon the powder charge. A quarter of a century later the principle was adopted for military arms,

SECTION OF RIFLE BARREL—HENRY'S PATTERN.

and W. Greener subsequently awarded £1000 in tardy recognition of his invention. When breech-loaders superseded muzzle-loaders the value of the expanding bullet was not so conspicuous, because a bullet as large as the greater diameter of the barrel can be introduced

THE FIRST EXPANDING BULLET.

into the chamber, and forced to take whatever depth of groove is found advantageous. In practice the bullet is still slightly smaller, but expands, or 'sets up,' at the base when the charge is fired, and thus prevents any escape of the powder gases past the bullet.

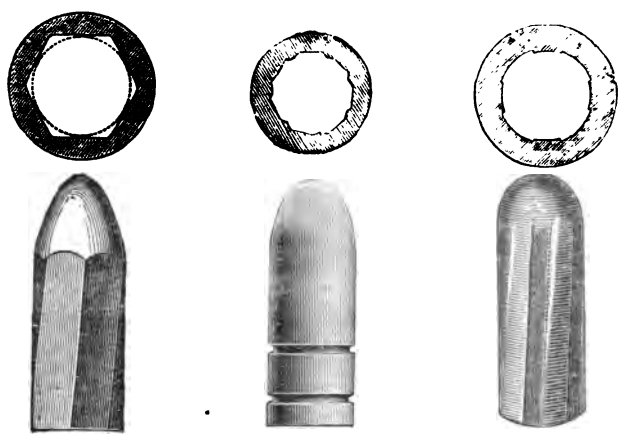
Rifles were first used for shooting at targets; they were developed as arms of precision. Then their greater accuracy led to their use for sporting purposes,

and the striking force and penetration of the bullet led to certain modifications, which were detrimental to the highest accuracy. Later, they came into general use as weapons of war, in which the qualities of both types are united so far as possible and advantageous. Rifles may be regarded as belonging to one of these three types.

Prior to 1850 it was generally held by military experts that the calibre of the infantry musket needed to be large, and the projectile heavy in order to stop a cavalry charge; bullets, even if driven at greater velocity, thus giving equal striking force, would not, it was contended, have the same effect, as they would pierce and wound, but not smash and instantly disable the advancing foe. The experience of sportsmen during a quarter of a century proved the contrary, and the tendency is now to still further reduce the calibre. The increased velocity of the bullet makes good the loss in weight, and the efficiency of the weapon is enhanced by the longer range it possesses, and the larger number of rounds the soldier is able to carry. So much for the barrel of the rifle. With respect to the breech mechanism, this has had to be strengthened owing to the greater strain upon it through the employment of smokeless powders, and a magazine and repeating mechanism provided in order to facilitate very rapid firing when required.

The infantry rifles of every power supplied with a modern equipment are of small calibre—the largest ·315, the smallest .256—whilst the most recent is only

.236, and such advantages as some possess are neutralised by having qualities from which other types are free. For instance, the English, French and German infantry rifles show no marked general superiority over each other, and, when placing them in the order of merit, they would change places according to the opinion of the expert as to which of



BULLETS AND SECTION OF RIFLING.

several qualities are undesirable, and which most advantageous in a military weapon. The English rifle is the heaviest, yet fires the lightest bullet in proportion to its calibre; its ballistic qualities are admitted to be good—better, the military authorities contend, than the men—which means simply that the method of training marksmen has not resulted in men able to get from the

rifle such shooting as it is capable of giving in other hands. The countries last to arm have naturally benefited by the experience of the French, and those who most quickly followed that lead; but whether such improvements have been made as will necessitate the re-arming of the British infantry with a rifle of different calibre is doubtful. The breech mechanism is admittedly inferior, but, so far as the shooting qualities of the rifle are in question, there is probably at present not one which will surpass it as a military weapon.

The Regulation Service Rifle is the Lee-Enfield of .303 inch calibre. Lee indicates the system of the breech-loading mechanism, Metford a shallow grooving with round edges for the rifling of the barrel—since superseded in the 'Enfield' pattern by reverting to the older form of angular grooves. The Metford has 7, the Enfield 5 grooves; length of barrel, 30.197 inches; twist of rifling, one turn in 10 inches, or 33 calibres, to the left; length of rifle, 49½ inches; weight, unloaded and without bayonet, 9½ lbs.

Ammunition.—Cordite, 30 grains; bullet, cylindro-conoidal, of lead, with a nickel jacket, weight 215 grains. A packet of 10 rounds weighs 9⅝ oz.

The Mauser Rifle is of two patterns—the German and Spanish. The former is .311 calibre, has a 29-inch barrel, with 4 grooves making a turn in 9.45 inches; the bullet weighs 226.8 grains; and the charge is 42 grains of a flake, smokeless powder. The Spanish Mauser is .276 calibre; has 4 grooves, with a turn in 9.80 inches to the left; uses a 245 grain bullet, with a

WINCHESTER REPEATING RIFLE.

SPORTING PATTERN .303 MAGAZINE RIFLE.

LEE-ENFIELD SERVICE RIFLE.

THE LATEST MANNLICHER RIFLE.

CADET RIFLE.

MODERN RIFLES.

charge of 37.8 grains of smokeless powder, and is considered superior to the German pattern.

The Mannlicher Rifle is of four or more patterns. The Austrian pattern, of .315 calibre, is not much used in this country; the Dutch and Roumanian pattern, of .256 calibre—differ chiefly in length of barrel—is an excellent long-range target rifle and an efficient small game stalking rifle. The United States Naval Service is arming with a .236 calibre rifle, from which a light bullet is used to give the unusually long point-blank range of 700 yards. The service rifles of other powers are practically unknown to English sportsmen: details of all will be found in the seventh edition of *The Gun and Its Development*, from which these particulars are taken.

The sighting of the rifles differs; in the Lee the finest division is 200 yards; the Portuguese and Turkish divide only to 500 yards. The Austrian has a long-range sight for 2 miles; the German for 2½ miles, but the extreme range is not indicated by the sighting; in the German Mauser it is about 4350 yards.

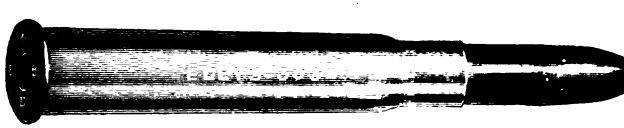
The muzzle velocity of the bullets is usually about 2000 feet per second, that of the Lee-Enfield is now about 2200, and the smaller calibre Mannlicher nearly 2500, which is also the velocity of the new U.S. naval rifle.

The efficiency of the rifle depends not only upon its soundness of workmanship, but upon its suitability to the ammunition to be used with it. The weight of the bullet must be rightly proportionate to the charge

of explosive, in order to obtain the maximum range, accuracy, striking force, or any desired combination of these; and the rifle sufficiently heavy to make accurate

FOR THE SPANISH MAUSER.

FOR THE ROUMANIAN MANNLICHER.



FOR LEE-ENFIELD RIFLE.

FOR MARTINI-HENRY RIFLE.

SERVICE CARTRIDGES.

shooting possible by diminishing appreciable recoil. Explosives being of different strengths, the correct weight of bullet for a given charge cannot be generally

stated, but can be calculated by the gunmaker, and verified by his experiments. In the service rifle the weapon is 300 times heavier than the bullet; the Martini of old regulation pattern only 110 times

.22—3—30.

.297—3—38.

.297—5—38.

.250—7—56.

CARTRIDGES FOR GALLERY RIFLES.

heavier, and shot-guns are made as light as eighty times that of the load with which they are to be fired. The heavier the rifle the easier to obtain uniform shooting, hence the limit of weight in competitions.

·310 CADET—3—125.

.300—6—80.

CARTRIDGES FOR MINIATURE MATCH RIFLES.

Of cartridges there are endless varieties, both for target and game shooting. The best only are illustrated here.

The .22 calibre, sometimes called the .230, is the smallest cartridge suitable even for gallery practice. The short bottle-necked is the Morris tube cartridge for indoor ranges; the larger that for distances up to

300 yards, at which extreme distance it is said to give good results.

The calibres from .250 to .380 are those of rifles most used for rook and rabbit rifles, for some of which hollow-pointed bullets are made. With the heavier bullets larger range and greater accuracy are obtained, and they are therefore preferred for target work.

In all the illustrations the figures mean first the calibre in decimals of an inch; that in the middle the charge of powder in grains; the last, the weight of the bullet, also in grains.

Service rifles are used for sporting purposes, as the

LEE-ENFIELD BULLETS.

killing of large game, but then, instead of the military bullet, one with a soft nose is used. The effect of this, as shown by the illustration, is that the bullet on striking spreads—or, as it is termed, 'mushrooms'—and its penetration is therefore lessened.

In the illustration, Fig. A is the common military form; B the same after passing through 45 inches of solid wood. Fig. D represents a soft-nosed bullet,

i.e., a bullet in which the nickel coat does not extend to the point, but leaves the lead core exposed; C, the same bullet after passing through only 12 inches of wood.

The target rifle differs from the military weapon in so far as the striking force of the bullet is sacrificed in order to obtain additional accuracy. No work is required of the bullet at impact, and it is found that a projectile having a low velocity in proportion to its weight will carry with greater certainty than a bullet sent the same distance in a shorter time, but with a quicker rotation also. For although this quick rotation is necessary in order to get the long range with the light bullet, it of itself increases the 'drift,' and so increases the liability of error in direction.

The conditions of the sport of target shooting have many times changed their character, are still subject to changes, and to define these is almost impossible. The chief condition—that which divides rifle-shooting with the target rifle into distinct classes—appears to be the range, or distance, at which the trials are made. The shorter the range, the less deviation in the lateral plane must there be from absolute accuracy. The longer the range, the greater the latitude allowed to overcome the difficulties presented. Range, therefore, governs the construction of the target rifle. Other limitations—as of the powder charge to be used, the maximum weight of the rifle and bullet—are imposed in order to encourage marksmen in the acquisition of a difficult art by starting competitors from a common base line.

Long-range shooting is the most difficult, but the long-

range rifle is not the superior of the military rifle as a weapon, only as a shooting instrument, and as yet no one knows the utmost possible of which the rifle is capable.

Target rifles may be classed as follows:—The long-range 'Match' rifle; the ordinary modern military rifle; the miniature 'Match' rifle (for short ranges and practice); and the 'rest' match rifle, a sort of scientific toy with which gunmakers, scientists and marksmen attempt absolute accuracy, with such mechanical aids as ingenuity can devise.

Ordinarily in the match rifle the weight of the rifle is so greatly in excess of that of the bullet that recoil, as affecting the shooting, is eliminated; this quality is also possessed in a large degree by the Lee-Enfield, which is therefore a good target rifle.

It is extravagant and costly to use a powerful weapon for mere target practice at short range, when so much can be learned from a rifle giving less ballistic value but equal accuracy at the distance. On the other hand, the more closely it approximates the modern standard the better, and if, instead of a high trajectory and low velocity with black gunpowder, there is any rifle which, with cheap ammunition, will give greater velocity and uses smokeless powder, that is the rifle, other things being equal, to be preferred. The author has endeavoured to produce such a rifle, and in the new model 'Sharpshooter Cadet' he believes he has attained the object sought. It is of .310 calibre, can be made with any breech-loading mechanism, Martini preferred for lowness of cost and efficiency, and of any

weight from 4½ lbs. The cartridge has a lead bullet; the explosive is cordite, or other smokeless gunpowder, which will give a muzzle velocity of 13,000 feet, therefore a low trajectory, and a range of about 400 yards. As a weapon it is suited for any game found in Great Britain—also antelope, kangaroo, etc., etc. The cost of ammunition is only one-third that of the Lee-Enfield cartridge. The velocity is greater and the trajectory curve lower than that of the small-bore American target rifles.

For a target rifle simply a single-loader is preferable to a magazine or repeating rifle—the complicated breech mechanism of the modern military weapon merely increasing the cost of the rifle without adding to its efficiency as an instrument of precision. Moreover, to beginners the magazine is likely to prove an element of danger, as, if used, a cartridge may unwittingly be left in the magazine, to be subsequently accidentally fired when working the mechanism in the belief that the rifle is unloaded. It is, of course, but an encumbrance if the rifle at the firing-point is treated as a single-loader, as it should be always. Therefore a simple breech-loading rifle should be chosen for the use of beginners, and the handling of magazine and repeating rifles deferred until the shooter has some experience of the rifle as a target weapon.

The breech mechanisms of the modern repeating military rifles are on the bolt principle—similar to that of the ordinary door bolt—the bolt being pushed forward after the insertion of the cartridge, and generally

then given a quarter turn to the right to lock it in position. The variety sometimes used is the 'straight pull,' in which an automatic device locks the bolt, and the hand moves in a straight line, pulling and pushing the bolt *without* turning it. This is supposed to be quicker than the earlier form, but its opponents contend that it is neither so strong nor so simple.

Of the other principles of breechloading, there are two chief varieties. One, as the Martini, in which the barrel and stock are rigid and the breech-block is moved to allow of the cartridge being inserted; and the other in which the barrel is hinged to the stock and drops for loading, as in the ordinary shot-gun.

The Martini mechanism is one of the simplest and cheapest of the block-action rifles. It is safe, durable and strong; it allows of an excellent 'pull off' with small load; it extracts and ejects the fired cases with ease and certainty. It can be manipulated correctly with very little practice, and, from having been the service pattern, its mechanism is known to most men. The one difficulty—cleaning the barrel from the breech end—is overcome in modern rifles by having the barrel detachable, a plan which allows of the rifle being stored in a small compass where desired.

The hinged-barrel mechanisms are of various forms, chiefly dependent upon the position of the lever which actuates the holding-down bolts. The greatest leverage is obtained when the lever is on the top and works in a horizontal plane, and leverage is necessary in order that the holding-down bolts may grip well and lock breech-

action and barrel firmly together. If the rifle is of small calibre, for small charges a less powerful mechanism will suffice, and a lever at the side actuating a simple catch-bolt engaging the lump under the barrel will be found convenient. For gallery rifles of .22 and like small calibres this system is strong enough and satis factory.

TOP-LEVER HINGED BREECH MECHANISM.

Other small-bore target and gallery rifles are procurable, and at even lower cost, but the expense of a good rifle need not be begrudged. If economy is necessary, choose a rifle which, by reason of its calibre and make, will shoot well with a small and therefore inexpensive cartridge. No satisfactory cartridge even for gallery practice can be purchased for less than three shillings the hundred rounds—the price of those used in the Morris tube.

There should be little difficulty in deciding upon the type of rifle best suited to the purpose for which it will be used. To decide upon the quality of one rifle from others of its like, the shooting obtainable is the best in-

dication of value. Whether making a gun or rifle, the first object I have kept before me is the safety of the weapon being made; since if it cannot be used with confidence it matters little how well it shoots, but the shooting—the actual performance—has been the next object always. Add to these strength and simplicity so that the weapon will last, and the result is an arm possessing all the qualities necessary to a first-class rifle—since without good workmanship they are not attainable.

Mere embellishment must not be expected in good weapons at low prices; decoration is not essential to shooting, and often the money so expended would be better laid out on the finish of the rifling and fitting, and adjustment of the sights. English manufacturers know this, and, as a rule, act upon that principle, but highly-decorated and seemingly expensive and high-class workmanship is found upon the non-essentials of many arms of Continental manufacture.

A name is one of the most satisfactory forms of guarantee, since no maker of reputation cares to have a bad shooting or faulty weapon sold to the public. A close diagram is unmistakable evidence of what the rifle ammunition and man can do, but it does not follow that even the most expert shot will always make good shooting with even a first-class rifle and perfect ammunition. But give him time and opportunity and he will do so. A diagram made with favourable conditions is therefore evidence of the rifle's quality, but because it cannot be equalled on demand

by another shot of like reputation, or repeated at will by the same shot, it must not be assumed that the diagram was not made, or that the rifle has gone off its shooting. Quite possibly the performance may be surpassed—many times. It is just possible that it may never again be equalled. For this reason rifle-makers, though keen enough to make the most of good diagrams, in everyday practice take an average standard performance as sufficient evidence of the quality of the rifle, and leave highest possible scores and records to be achieved by the user of it. The would-be purchaser of a rifle should require a diagram, made at that distance at which the rifle will be used, or with long-range rifles at a sufficiently long range to indicate clearly its accuracy. An enthusiastic tyro may easily be disgusted by having to practice with a weapon incapable of shooting with the accuracy expected of it.

'Marksman's' test for a service rifle is:—

'Procure a long strip of paper with a line down the centre, and paste to a smooth, straight board. Set this up endwise close to a high thick bank or penetrable stop butt, and with a mason's plummet ascertain that the line is perpendicular. Put a black bull's-eye about half an inch in diameter *on* the line near the bottom. Shoot through the V, and aim at the bull from exactly 25 yards' distance, and the bullet should strike not more than one quarter-inch to the right of the line about 1½ inches above the bottom of the bull's-eye. A good shot with a good rifle may sometimes put ten consecutive shots through a hole that a sixpence will cover. Then put a central line on the bar and shoot with the leaf up. The shots will often miss the line, but may hit it; that is not of great importance either way. But if the shots strike about half or even three-quarters of an inch to the right of it, then drift has been allowed for, and the rifle

will shoot straight at 500 yards, but whatever line is needed to bring the shot about three-quarters of an inch to the right of the line will be the true side zero of the rifle. Methods of holding and aiming—and positions—vary so much that the rifle cannot be sighted to exactly suit everybody. It may have been very carefully adjusted, but fall into very different hands. But large errors show that it was not truly sighted at all. The correct elevation for 500 yards will cause shots to strike about 7 inches above the bottom of the bull; the elevation and line needed should be carefully noted, as they give the best possible information 'where the rifle shoots.' Each quarter inch at 25 yards from the muzzle is one 'degree'—or 150th—on the vernier. The proper line for 500 yards is nearly three degrees to the right of the centre line on the board. The rifle will not shoot at 900 yards as it will at 500, for the 'drift' is two degrees more towards the left. Whatever is the shooting centre at 500 yards, that at 900 is two degrees more towards the right.'

It must not be forgotten that the Lee-Enfield has greater drift than the Lee-Metford, for which latter rifle the above data are presumably computed, but this does not affect the principle of testing to ascertain elevation and zero.

As no rifle can be expected to shoot well with a dirty barrel, it is evident that a rifle with one that is rusty, uneven, and unpolished inside will not prove accurate. Therefore, in any rifle, see that the interior of the barrel is at least bright and clean. The real point of importance is the sighting. The sights should not only be accurately set, correctly graduated and marked, but also well finished. That is, the surfaces square so as not to reflect light, and admit of dead dull blackness. Both sides must stand the same height; and if there is a tangent, the bar should slide evenly upon it, and be perfectly horizontal at any height. If the slide stands

slightly towards the muzzle when raised, so much the better. In any case, the bar, V, and all back-sights should be slightly bevelled along the top edge, so that, when in use, only the thinnest line is seen by the eye aiming. The fore-sight, no matter what pattern, should be clearly cut, the bead or barley corn quite free from burrs, and the block from which it rises flat, level and square.

With full-stocked rifles the forend and bands should fit closely but not tightly.

The 'pull off' of the trigger must be uniform, without drag, and if not capable of adjustment, set to the exact weight desired.

With all weapons listed under £5, remember that if the shooting has been tested, the sights set and regulated, and a diagram of the shooting obtained, the cost of this work has not been less than the actual cost of producing the rifle—stock, lock and barrel.

CHAPTER IV

PRELIMINARY PRACTICE

It is as impossible to learn to shoot without practice as it is to learn to swim without getting into the water, but much preliminary knowledge may be obtained which will prove of real service when the first actual attempt is made to hit a mark. The useful preliminaries to be mastered prior to shooting include the acquisition of a correct position, ability to aim, sight, and pull off. Whether or not all, or any, of these may be learned from printed instructions is doubtful; but it is quite certain that, given an example to follow, the beginner will make more rapid progress if he understands why certain positions are taken, and why some things are done; and farther, in the case of personal tuition, if the pupil knows the reason, not only is the instructor's task lightened, but the pupil's interest in the lesson increased.

It is essential to good shooting that the rifle be held firmly, and the firing position be easy to the shooter. The rules of the military drill books may be observed by most, and those are the most generally applicable which refer to shooting in the offhand position, but some latitude must be given in order that the individual may assume the one that suits him best. It has been found impossible to make compulsory any exact method of holding the rifle, yet allow of general interest being

taken in the sport of target shooting. It is now recognised that the position that is advantageous to some is disadvantageous to others, and consequently the adoption of any position, within certain limits, which

OFFHAND POSITION.

does not require artificial support, should be allowed generally.

Of the recognised positions, the chief are—offhand, military, kneeling, sitting, prone, fancy reclining posi-

tions, and positions taken when firing from mechanical rests. Of these positions, the offhand is probably the most generally useful, the most common, and the most difficult to perfect. It is the required position in contests with military rifles at short ranges, but does not admit of sufficient accuracy for shooting at long distances.

Offhand, standing position. The military direction for assuming the regulation position is:—

'PRESENT.—Bring the rifle at once into the hollow of the right shoulder, pressing it in with the left hand. Back-sight to be upright; left elbow well under the rifle, right elbow a little lower than and well to the front of the right shoulder. As the rifle touches the shoulder, bring the cheek down on the butt, close the left eye, align the sights on the mark, place the forefinger round the trigger without pressing it.' 'The right foot is about 8 inches to the right and 3 inches to the rear of the left, the right foot to point to the right front.'

Observations.—The army musketry instructor can teach this position excellently. The pupil should remember that comfort when firing will in some degree depend upon the position of the butt, which should be well into the pectoral muscle, and held there firmly. The variations allowed are, for military competitions, quite unimportant. Ease is oftenest secured by accustoming oneself to grasp the rifle by the left hand, where it balances if held in it alone. By the rules of the N.R.A. the left hand may grip the rifle anywhere forward of the trigger-guard. Some shots, therefore, stand with the feet wider

apart, the left hand as near the breech as allowed, the left elbow resting against the left side; in fact, a body rest position. For general and sporting purposes it will be found better to grip the rifle with the left hand at such distance from the breech as the length of the shooter's arm finds easiest when supporting the rifle.

Variations.—Holding the rifle with the left arm fully extended—useful with light rifles when shooting at

KNEELING POSITION.

quickly-moving objects. Using the left hip to support the elbow, and a handle held in the left palm to prop up the rifle—a position used on the Continent and in the United States among German colonists there.

Kneeling.—Regulation position. 'Point the left foot to the front; carry the right toe well to the rear and straight behind the left heel; sink on the right knee, which point to the right front; bring the weight of the body at once on the right heel, place the left elbow on

the left knee, with the forearm not inclined to either side.

Observations.—If the right foot is well behind the left, the lower part of the right leg will be at right angles to the rifle, which should be well across the chest, and the right knee, instead of being as ordered, will point more to the right, a position of greater stability and comfort for most men. If thick-soled boots are worn, the heel

SITTING POSITION.

will form a fairly rigid seat, and the strain on the toes and instep lessened; to rest the right foot on the instep by kicking a small hole in ground for the toe aids some.

Variations.—A good kneeling position, quickly taken, is secured by putting the right foot further to the rear, the toe pointed to the right or to the rear, and the body inclined forward when the right knee touches the ground.

Sitting.—Regulation position. 'Turn half-right, hold

rifle with the left hand horizontally at the side; sit down, placing the right hand on the ground; shift the feet to get into a comfortable position, and bring rifle to the "Present," resting the elbows on the knees.'

Observations.—This position is for cavalry, or those wearing spurs, the equivalent of the kneeling position, but is inferior to it for ordinary target purposes, but when game shooting often very useful, especially when shooting on a steep slope, when it is more uncomfortable either to kneel or lie prone.

Variations.—For deliberate shooting the knees are drawn well up; the arms crossed and the rifle butt placed against the muscle of the arm and fired across the breast, the head being turned to the left and the body facing the right. Or, the left leg may be crossed over the right and, the left elbow resting on the left knee, the left arm forms an almost horizontal rest for the rifle. Practice is required to use either position with comfort or advantage.

PRONE POSITION.—This is the easiest to acquire correctly, the best for target practice, essential to accurate long-range shooting and the most general and useful. The regulation directions are:—'Turn half-right, holding the rifle with the left hand horizontally at the side; carry the right foot well to the rear, place the right knee and hand on the ground, and lie down on the stomach obliquely to the point at which the aim is to be directed; bring the rifle to the first position of "the Ready," the left elbow well to the front, the forearm resting on the ground to the front of it, the right

shoulder well to the rear, the head and eyes straight to the front. "Present"—Bring rifle to the shoulder without moving the elbows from the ground.'

Observations.—Both forearms should be turned inwards from the elbow; the legs may be hooked one over the other, but it is much better to keep them well apart. The essential feature of a good prone position is to have the legs well to the left—the body at an angle of about 45° to the rifle, that the effect of the recoil may be less burdensome. The left arm must be brought well under the rifle, and the forearm as

PRONE POSITION.

nearly perpendicular as the elevation of the rifle allows. The shooter should not wear tight clothing about the neck, should relax all muscles of the body below the arm-pits, and *hug* the ground as closely as comfortable.

Note.—The body should not be in a line with the rifle, as then it cannot yield to the recoil of the rifle, which, if very heavy, may then fracture the collar-bone, and the position is not recommended for shooting with 8, 4, and large bore rifles or in big game shooting.

Back Position.—The rules of the N.R.A. admit a back position in military competitions, and directions for

assuming it were inserted in the edition of the official *Musketry Instructions*, issued in 1892, but have been omitted from later reprints. Ignoring the old directions, the best way in which to assume the allowed back position may be described shortly. 'Sit on the ground facing the target, holding the rifle across the body; lie on the back, then turn sufficiently on the right side to allow of the right thigh being almost squarely on the ground; the legs should then be drawn

BACK POSITION.

up, placing the left foot flat on the ground with the toe pointing to the right front, the knee almost upright, but inclining slightly to the left. The right leg from the knee hooked round the left foot, so that the side nearest the ground rests upon the left instep. The barrel of the rifle should be laid on the right knee. The left hand grasps the top of the stock just in front of the butt-plate, which is placed further in between the arm and shoulder than in other positions. The head must then be raised, and the left coat sleeve taken between the

teeth to support it. The right elbow rests on the ground, and the right hand grips the stock lightly.

Observations.—This position is not likely to be of much practical utility in game shooting; its chief advantage is at extreme ranges, when a high elevation of the sights is necessary, but is also sometimes convenient when shooting downhill. It is as good as any of the fancy lying-down positions, with the left arm behind the head, or that of lying on the right side and resting one leg upon the other and the rifle across both. It is excellent for orthoptic sights, and gives greater steadiness and clearer vision, but requires more constant practice than any. It also requires slightly lower elevation, and ground must be level, or sloping somewhat towards the target.

The variations are usually directed towards supporting the rifle otherwise than by contact with the calf of the leg, or anywhere else where the pulsation of an artery may interfere with accuracy of aim. The back position is considered 'unmilitary' by many, but the late Captain Foulkes wrote in defence of it. 'If I were on level ground I should, until the enemy were at very close quarters, fire in the back position, for I should attain greater accuracy, and as great, or greater, rapidity of fire.' The recognised military positions are—off-hand, kneeling, sitting and prone; the unrecognised—the back position first described; unallowed—all variations of the back position and fancy positions generally. In competitions the off-hand is compulsory at all ranges up to and including 100 yards, the sitting and kneeling from

200 yards, the prone admissible at 500 yards and beyond, and the back position at extreme ranges.

Position of rifle.—The rifle in all competitions must be kept with the muzzle directed towards the target, and must be drawn back for alterations to elevation of the back-sight, etc., *not* turned round. To accomplish this when in the prone position:—

'Without altering the position of the left forearm, loosen the grasp of the left hand and draw back the rifle until the lines can be read, adjust the slide with the right hand as may be necessary, return the hand to the small of the butt, carry the rifle forward, and fix the eyes on the mark.'

Rests.—Mechanical rests are much used on the Continent, and are allowed in some competitions in the United States of America, but are ordinarily forbidden in England. Firing from a rest is not unlike actual work of the rifleman when entrenched, and, consequently, may be practised, especially by beginners, who wish to improve their command of the rifle. A tripod; an upright with cross bars at different heights; a table the height of the elbows, with bags of sand upon which to rest the rifle are the ordinary varieties in use.

For successful results, whichever position is assumed, it must be taken naturally, must be comfortable, without such tension of the muscles as will speedily cause fatigue. The directions and illustrations are, therefore, not to be followed exactly, but merely indicate that which may be attempted with best chances of success. Practice,

frequent and painstaking, will be the best means of ensuring handiness in using the rifle and in assuming and maintaining a position of comfort for firing.

The grip of the rifle with the left hand must be firm enough to prevent the weapon slipping, but not *tight*, for that will induce a tremulous motion which is fatal to accuracy; ease, security, and the comfort that results from practising the position enhance the chances of good shooting. Conjointly with the acquisition of a correct position, aiming and sighting with accuracy should be learned. To aim, is to direct the weapon towards the object; to sight, to have the indicating points—sights—in true line with the object mark. To take a position, to aim and to sight are not so simple or easy as the actions seem. The Musketry Instructions direct that:—

(*a*) The back-sight must be kept perpendicular.

(*b*) The eye must be fixed on the mark, not on the sights.

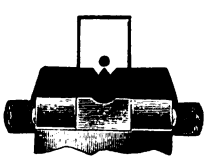
(*c*) When sighting, the left eye is to be closed.

(*d*) Aim must be taken through the centre of the back-sight and the fore-sight.

The last direction must be first considered. It is a matter of impossibility to focus the eye simultaneously upon three objects at different distances from the eye. The mark being the most important and the most difficult to see, because the furthest distant, must be the object of the three upon which the eye is to be focused. Then, if the weapon is truly aligned, the back and fore-sight of the rifle will be interposed

between the eye and the mark so as to be themselves observed, but not obscuring the object. They will neither of them appear so conspicuously as when looked at, but both must be seen clearly. Both being out of focus, will be to some extent blurred, and must, therefore, be of shape and colour best adapted to impress the eye directed upon the mark. In the military rifle the back-sight is a bar having a narrow notch or V in the centre of its upper edge; the fore-sight, miscalled a 'barley corn,' is an elongated tapering ridge upon a square block, but it appears to the eye

A.—WITH SPORTING SIGHT.



B.—WITH MILITARY SIGHTS.

AS THE BULL'S-EYE SHOULD APPEAR ABOVE THE SIGHT.

4 feet distant as a simple pyramid or Λ, perhaps slightly flattened at the apex; the two forms, it is found, most likely to attract the eye. The rule is that 'the aim, which must be an exactly true one, must be taken through the centre of the notch of the back-sight,' the fore-sight interposing between this and the mark should appear with 'the top level with the shoulders of the notch'—that means that what is called a 'full sight' should be taken, as shown.

The experience of most good riflemen is that the notch is not the best form of back-sight, that it appears less conspicuous and is more 'blurred' when the eye

is focused upon a mark at 1000 yards' distance than a straight line whose centre is indicated by a perpendicular white line reaching almost, but not quite, to the upper edge, so it is customary for them to reverse the sight-bar and see the fore-sight over the straight edge as shown on page 81.

Against the pyramidal fore-sight it is contended that the shape does not allow of easy distinction of different degrees, since whether a fine, medium or full sight be taken, its shape is always the same, that of an equilateral triangle—see page 81—and where the use of the military pattern fore-sight is not compulsory, a square block fore-sight is used for fine shooting; because, if, with this, the same amount of fore-sight does not appear each time above the horizontal line of the back-sight bar, the alteration in shape to an elongated pillar, if too much, and to a squat oblong, if too little, makes the error in aiming at once noticeable. Where the military fore-sight is compulsory, it is usual to blacken that part of the sight which ought to show above the bar when the aim is correct, and to paint white all below it, so that a too coarse sight is the easier noticed, but, of course, the taking of a too fine sight is still as easy of accomplishment. Other aids to definition consist in marking with white a small portion of the fore-sight which shows above the back-sight, as illustrated in the note on 'Definers' (page 89).

For short range game shooting where a quick aim is necessary, the most generally useful sight is the open V leaf back-sight, with a central white line of platinum;

and, for the fore-sight, a black half barley-corn, which appears as a simple *bead* when seen in line with the back-sight and the mark, as illustrated in Fig. A, page 72.

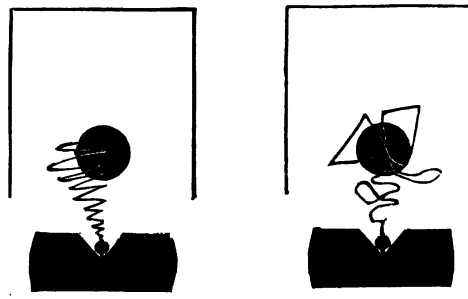
There are other special sights which must be made the subject of remark later, when the tyro will the better comprehend their qualities by knowing the limitations of the commoner varieties already mentioned, for the way of using them must be now explained.

They are black because usually directed towards a white target, black makes them more distinct, and they are dull-black so as to be as nearly as possible irresponsive to variations in the intensity of light. As the eyesight of one man differs from that of another, so must the amount of fore-sight to be taken in aiming differ with individuals; it must with no one be less than is required to be distinctly seen in ordinary light; but the less, that is, the finer the sight really requisite for definition and unmistakable recognition, the finer the shooting possible, but, even with the finest eyesight, a sudden change of light may cause the fine fore-sight to be momentarily lost to view, and irregular shooting will then result. The one thing every shot should strive to do is to take the same amount of fore-sight on all occasions; to alter the amount intentionally is disastrous; to avoid altering it unintentionally most difficult.

Assuming that the part of the fore-sight meant to be visible is distinctly discernible over the back-sight, the next thing is to get it fixed upon the mark. In ordinary circumstances this is not the bull's-eye itself but just below its centre. The top of the fore-sight, no matter

of what shape, should be apparently separated from the bottom of the bull's-eye by the thinnest possible line of white, because then the aim may again and again be directed at the same place with greater chances of exactitude than if the fore-sight covers any portion of the bull's-eye itself, or hides the most conspicuous portion of the target. In short, the bull should appear as in Figs. A and B on page 72.

It is a matter of absolute impossibility to hold the



X.—HOLDING ON. Z.—HOLDING BADLY.

SIGHTING THE BULL'S-EYE.

rifle in the exact position required even for a moment. As the fore-sight nears the bull—which always appears as a small black dot only, over the sights—the movement of the muzzle will be discernible; it will, when held properly by an expert, describe much the same 'wobbling' as indicated by the line in Fig. X. The action of the heart and lungs prevent the rifle being held still. At short range, with a large target and coarse sights, the tremor is less noticeable, but off-hand, at even 200

yards, no one can hold a rifle on a bull's-eye except for the briefest imaginable period, consequently as the foresight approaches the point desired the trigger is pressed.

By inflating the lungs and holding the breath whilst sighting, the weapon is held steadier. From the moment the eye is placed opposite the sights until the trigger is pulled no breath should be drawn nor emitted. By taking a few long breaths before raising the rifle, and so refilling the whole of the lungs with fresh air, the shooter will find it easy to hold his breath for the time required for sighting and shooting. If not, the rifle must be lowered a little, a fresh breath taken, and a new alignment made.

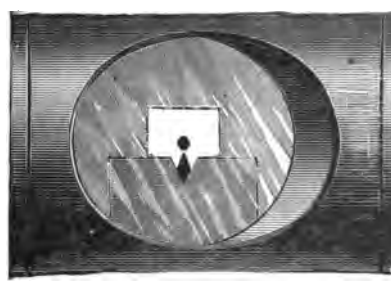
And when taking aim, the aim and nothing but the aim must have the shooter's attention. He should give no thought to elevation or wind allowance or other matters, having *previously* convinced himself of the line of aim necessary for his purpose, and devote himself for the time being to accomplish that and that alone.

As for the remaining rules, the closing of the left eye is optional. The beginner should close it and align the rifle with the right. In time, when practice will make this natural to the right eye, the left may be kept open.

To keep the back-sight perpendicular is not so easy, because military rifles are made with straight stocks and many shooters find great difficulty in getting the face far enough over the stock to aim with ease and comfort, and to twist the weapon over to the left is so easy, that it must be guarded against by the use of a small spirit level attached to the right, so that the bubble is

always visible when the rifle is perpendicular, and in match shooting, and whenever and wherever allowed for long range shooting, its use is to be commended to beginners and experts alike.

To fire the rifle; the right hand should grip the stock firmly, and the forefinger placed so far round the trigger as to press it with the second joint. To release the trigger there must not be any pull, merely a steadily



THE AIM REFLECTOR.

increased pressure until the scear is released. After a little practice the shooter gets to know exactly the amount of pressure necessary. The beginner should be careful, and practise constantly, snapping off the lock when the weapon is empty, and having held the sights upon the mark watch them as the trigger is pulled, and then any movement of the weapon due to that action will be at once recognised. The practice must be continued until the trigger can be worked without any movement of the weapon itself. This is of more importance to the beginner than it appears to be at first

sight. If it is not corrected before firing is commenced, then the recoil, the smoke, and other happenings will prevent the shooter observing such errors as possibly may be due solely to his improper pulling of the trigger.

The best aid to the instructor is the aim reflector, a small contrivance slipped over the sight which shows to a person standing at right angles to the shooter the aim that is being taken, and yet in no way interferes with the shooter's view of the sights or the targets.

This preliminary practice does not require a range, and may be performed almost anywhere, and the more often the better. Its object is to reduce the number of the varying causes that affect the course of the bullet. To turn into constants, such practices as with the unexpert and the careless are irregularly performed, and consequently increase the list of possible causes of error, a list from which it is the rifleman's one endeavour to eliminate all that can be ascertained and—so overcome.

RIFLE CLEANING.—To obtain accurate shooting the inside of the barrel must be kept *bright* and free from rust. The acid foul-forming cordite and smokeless powder will soon cause corrosion. It must be removed: first use the pull-through and cleansing oil. As soon as possible thoroughly clean rifle with a rod, bristle brush and flannelette soaked in cleanser *over* the brush. Cleansers are alkaline to neutralise the acid residue. To make: put in alcohol—methylated spirit—as much pure caustic potash as it will absorb. Use a gill to one pint of best mineral oil, keep in a glass-stoppered bottle. Thin with petroleum, and if required, thicken with vaseline. Having the rifle quite clean—pull through a piece of white rag several times without soiling—and dry and bright, oil it well with Price's Rangoon oil. If put away for a time use best vaseline. Coat barrel inside completely and thickly, and plug muzzle with vaseline.

CHAPTER V

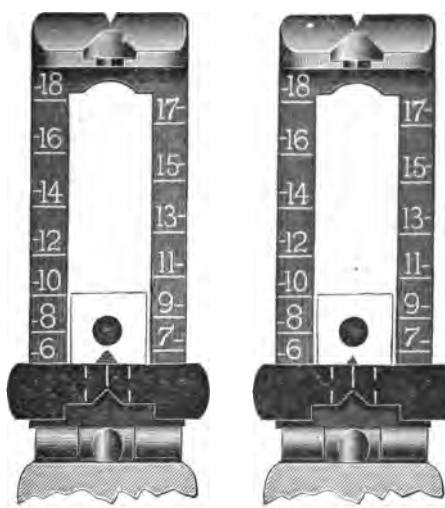
HINTS TO BEGINNERS

CONFIDENCE in self and one's rifle is essential to successful sharpshooting; this can only be obtained by achievement. When the rifleman has so far mastered his weapon as to be able to direct it in any desired direction, and to hold it there until fired, it will be time enough to learn in which direction he must hold it—or rather, just where he must aim—in order to hit the mark. Mere efficiency, from the military standpoint, may be obtained by rule of thumb; proficiency requires intelligent work.

Shooting practice should be begun in that position which is easiest to maintain—the prone—and at short range, in order that the result of each shot may be ascertained. In the correct position, the body will be quite at ease; the rifle, well balanced in the palm of the left hand, will tend to drop at the butt; the right hand will raise the butt to that position required to depress the muzzle until the fore-sight is directly below the bull's-eye, and keep it there. The head must not be leant over the butt of the rifle in order to get the

eye in line with the sights, still less must the rifle be tilted to the left in order to bring the back-sight in line with the eye. To correct the maladjustment of shooter and rifle, move the body more broadside on to the target, bringing the rifle more across the chest, until, with the rifle quite upright, the cheek just resting on the butt of the rifle, and the head inclined slightly forward, eye, sights and target are in line. If the position is easy, if there is no straining, the rifle may be held motionless, the eyes rolled away from the object—even the head slightly moved—and yet, when the eyes are again directed to the bull's-eye, the sights will be found to be still in perfect line with them. This is quite impossible if any of the muscles of the neck have to be strained in order to get the head into the required position. Then, having learned to pull off without causing the rifle to move, and, after snapping off a time or two to be reassured on this point, put a cartridge in the rifle and fire. If the preliminary position and aiming drill have been properly performed, and the rifle is correctly sighted, this shot should be a bull's-eye —or somewhere very near it. Before trying another shot, aim and snap off a few times at the target, and try to ascertain whether or not the rifle is still held fairly on the mark during the pull on the trigger. The 'kick' from the recoil of a service or miniature match rifle is now so inconsiderable that it is unlikely to hurt; but the shock from the firing causes a natural contraction of the muscles, which may move the rifle, and, as the pressure upon the trigger was followed by the firing of

the cartridge, this same use of the finger will be the cause of a natural involuntary contracting of the muscles on all future occasions until, by a willed determination that the muscles shall not so contract, the inhibition becomes operative, and ultimately automatic. Probably before this necessary condition is secured there will be many shots fired wide of the mark. At short range the



FULL SIGHTING. FINE SIGHTING.

AIMING WITH MILITARY SIGHT, AND THE REVERSED BAR.

divergence will not be so noticeable, and so the beginner will be encouraged to persevere until the shots on the target are in a group not larger than the bull's-eye—whether in it or not is of no immediate moment. When that is achieved the beginner may feel assured that he is capable of becoming a marks-

man. Some of the shots will be outside the group. If the shooter knows why these are wide—such as if the shot resulted from prematurely pulling the trigger, from nervousness and the like, he must determine to avoid such occurrences in future. If he does *not* know why any shot is away from others of the group, he must ascertain that before he can hope to prevent the re-occurrence of like wild shooting.

It may be that the aim is in fault. If this is so, a set determination to aim at exactly the same spot every time, to take exactly the same amount of fore-sight, and, in short, to do better, may result in a second group of ten shots being placed more compactly. Or the instructor, or coach, may place Steward's reflector on the rifle, and watch the aim taken by the shooter, and point out wherein it lacks accuracy. If it arises from an uncertain pull on the trigger, the 'pull' moving the rifle, guard against this by using greater care, or, with the service rifle, prove it by using the safety-bolt as a hair trigger. To do this put on the safety; aim the rifle and pull the trigger hard, keeping it with the grip of the right hand well 'home' against the back of the trigger guard, then with the thumb slowly depress the safety bolt, this will free the striker and fire the gun, and it can be done with less disturbance to aim than the best 'let off' of the trigger allows. It is consequently disallowed by the military authorities, and would disqualify in a competition under N.R.A. rules—but it will enable the shooter to ascertain whether his pull off influences his shooting or not, and, in a dangerous

position it may help to an accurate shot. The 'pull off' of a service rifle is unnecessarily heavy—six pounds—not infrequently 'drags,' and is irregular. The beginner must get to know exactly when the trigger has travelled the required distance to free the scear and fire the gun. From that instant to the moment the bullet reaches the muzzle is only the fraction of a second—about three-hundredths—but as it is the position of the muzzle at the instant the bullet issues which gives it the initial direction, the rifle must be so held and fired that the departure of the bullet shall exactly coincide with the correct alignment of sights on the mark. If the beginner will refer to what has already been stated about aiming, he will know that it is impossible to hold the rifle absolutely motionless for any length of time; the nearest that many good shots can do is to get a regular and infinitesimal variation constant for a few seconds—and that only so long as the breath is held without the least inconvenience. This motion of the muzzle is not readily discernible by the unaided eye with the ordinary coarse sights of the military rifle. If an orthoptic back-sight be used and an open bead fore-sight—of that size which will, when 'held on,' surround the bull's-eye and show it with a narrow white band—the movement of the muzzle will be immediately noticed by the variation in the width of the white band and the difficulty in keeping the 'black spot' exactly in the centre. To apply this knowledge with advantage, when you are 'holding on' as nearly as you can, observe that the fore-sight touches and recedes from the mark with

regularity, and press the trigger at the moment the movement is towards the mark; do this constantly and consistently, remembering that your sole object, until you have learnt to shoot, is to keep all your shots together on the target.

It may be that there is unknown and involuntary shirking of the recoil—this will account for the wide shots. Practise 'snapping' with greater care and diligence, and get your coach or instructor to load, or leave unloaded, the rifle he hands to you. If when you

THE CORRECT AIM (with orthoptic sight and open bead).

believe it unloaded you 'snap' and the rifle fires, and the shot shows that the aim was correct, a little determined practice will give you control of the muscles and inhibit the involuntary contraction following the pulling of the trigger; nothing can prevent the contraction after firing—for that is a reflex action and, luckily, does not affect the shooting in ordinary cases.

Having learned so to shoot that all shots group closely, proceed by altering the sights to get the groups

centrally placed upon the bull's-eye. If you take a good average full fore-sight, by no means alter it. If you use the V in the back-sight and shoot to one side, take to using the bar, and mark the line upon it not quite in the centre. Always aim at the same place on the target—just below the centre of the bull's-eye; do not be persuaded to aim at the upper corner of the target, along the top line, or the bottom edge, for, on the whole, just below the bull's-eye will prove the most advantageous.

The next thing is to compete; mere practice, no matter how assiduous and determined the beginner may be, is likely to degenerate into perfunctory desultory firing at a mark. If your competitor is of your own class, so much the better; but rather than not compete accept handicap points from a better shot, even if you undertake to hit the target only, whilst he—for this score—counts all outside the bull's-eye as misses. It will encourage you to persevere and to have greater interest in every shot you fire.

Another reason for competition is that it teaches the beginner to be careful; careless aiming and careless firing is even worse than no practice at all. Each aim should be taken with the one idea of hitting the mark—be intent upon 'winning'; it is practice of this kind alone that will help in sterner competitions, whether at the butts or on the field of battle, and will have its good effect upon your character as you make your way through the world, no matter in what walk of life fortune may force you. It will nerve you to meet the stress of com-

petition, more especially if your contests are made to conform to N.R.A. or other accepted conditions. You will learn to become a quick shot as well as an accurate one, and you will find that there is less difference between your scores made in practice and those made in competition than there is in those of even better shots under like conditions. Always treat your first shot, though 'sighters' are allowed, as the first round of the competition; and if you would succeed, take care to shoot sometimes at other hours than when the sun is setting, and at other ranges than the one to which you are best accustomed.

With confidence in yourself and your rifle, you will soon want to try other positions than the prone. The kneeling should be mastered before learning to shoot 'off-hand,' without a rest. Then, when you get to longer ranges, do not be impatient to pass on to even greater distances. Become master of the 500 yards before taking altogether to the 600; when those are fairly easy—well within your ability to score at nine times out of ten—go to the longer ranges, and you will then learn so much about the rifle, its powers, its limits and its defects, that practice with the weapon simply for the knowledge that practice brings will satisfy you; even competition will probably seem insignificant in comparison with the solution of such problems as each marksman discovers for himself.

On the whole, the use of the sling is not to be recommended; learn to shoot off the bar, and if you want variety, try changes of position and in how little time

you can correctly align the rifle in all; also try what you can do with other rifles than your own. Begin early to record your scores, to observe closely the weather conditions with which they were made, and when you fail, try to ascertain wherein the fault lay. The target is your most lasting enemy; note then carefully the times you hit him fairly in the bull's-eye; it is a hit back at you when you do not.

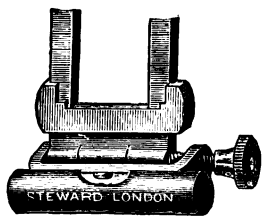
Efficiency in musketry is not a high standard in the Army Regulations. The trained men to pass as marksmen have to obtain only 105 out of a possible of 160 points; a second-class marksman only 60. Recruits to pass as first-class shots must score 330 out of 560, whereas the average Bisley marksman ought to score 90 out of a possible of 105 if he intends to win, and, as shown elsewhere, there are Volunteers who have made highest possibles again and again—such men are proficient. An efficient marksman every Englishman who is able to use a rifle can certainly become very easily; comparatively few will be content to remain at so low a level as the present 'military' standard.

The efficiency required of candidates for the force of 'Sharpshooters' sent to South Africa is to better a score of 50 out of a possible 84 points—sufficiently easy of attainment by Volunteers.

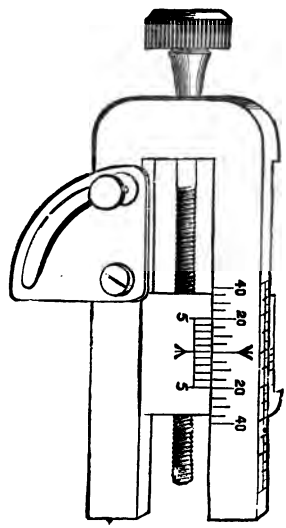
The *aids* to shooting comprise verniers for accurately adjusting the elevation of the sights, and marking a line on the bar as a guide to the allowance necessary for wind. 'In any military breech-loaders' more latitude is given as to the sights which may be used. For

DETACHABLE ORTHOPTIC.

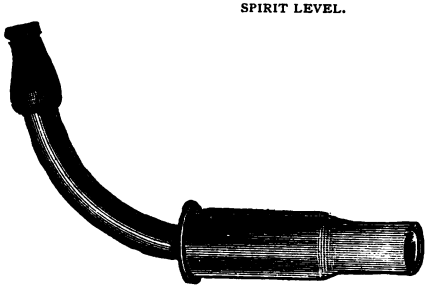
ADJUSTABLE ORTHOPTIC SPECTACLES.



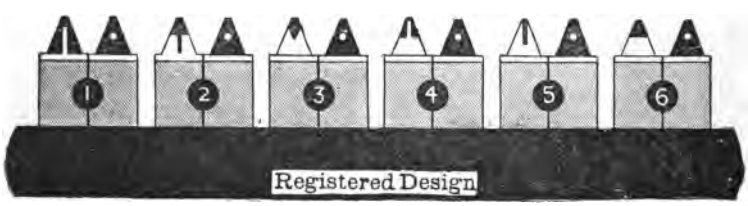
SPIRIT LEVEL.



VERNIER, ELEVATOR AND WIND GAUGE.



BARREL COOLER.

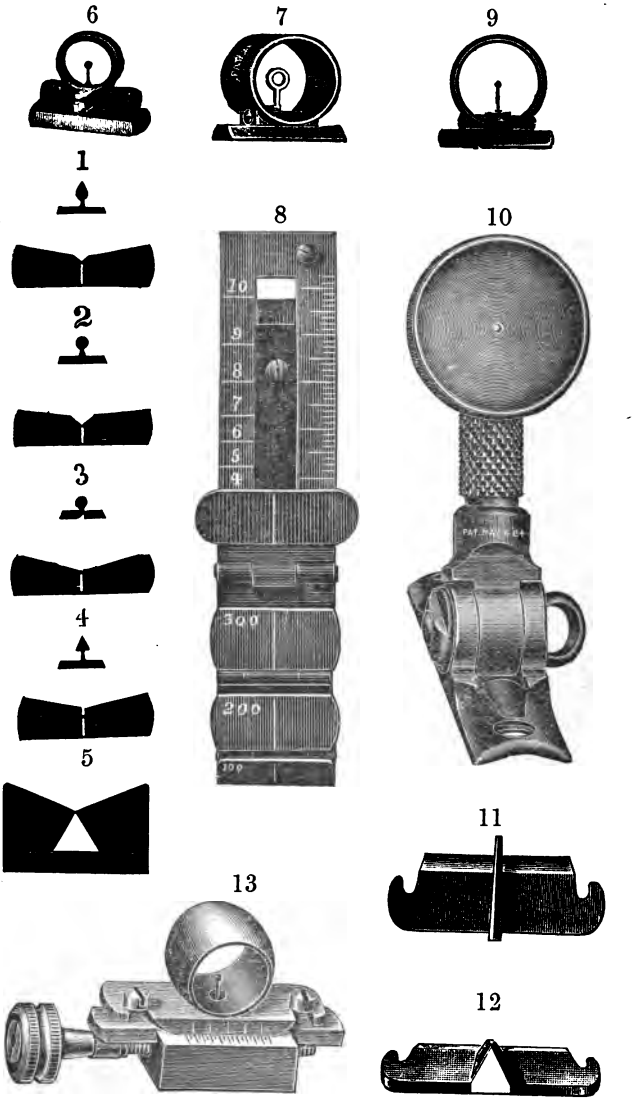


FORE-SIGHT DEFINERS.

RIFLE-SHOOTING APPLIANCES.

instance, a spirit level may be attached either to the back or the fore-sight. By constant care, the ordinary military rifle may be habitually held level, but with match rifles the indication of the sight does not aid in this, since orthoptics are almost invariaby employed. The principle of the orthoptic is the focussing of the field of vision before it reaches the lens of the eye. Its chief advantage is better definition, especially of the fore-sight and bull's-eye, and the orthoptic itself serves as the back-sight in the match rifle. A detached orthoptic—that with the adjustable iris diaphragm is the best form—is allowed with military rifles. It may be fixed instead of or in conjunction with spectacles, or simply attached to the shooting hat, or held over the eye by placing its tang under the glengarry cap. To aid in defining the fore-sight and help in making constant the 'amount' taken when aiming, blacking is resorted to, and upon the black ground a white line or spot is marked with a stencil 'definer.' As to the patterns the shooter must decide for himself. Some shots make excellent shooting without marking the fore-sight, but probably their eyesight is very good. Some paint only the block white, others all of the barley corn they do not wish to take (see No. 6), but the most general is the small central white spot. Telescope and magnifying sights are not allowed; but as in many instances excellent work is done in the field and at the target with all sorts of rifles fitted with them, the rigid objection to their employment seems unreasonable.

For other than military rifles there is an endless



RIFLE SIGHTS.

variety of sights. For match shooting nothing is equal to the orthoptic match rifle sight. For sporting purposes something nearer akin to the military pattern is more advantageous. In the illustration Nos. 1 to 4 are varieties of the sporting-sight used for double game rifles. No. 5 is an open V back-sight, with a white pyramid instead of a line—an excellent sight for all-round field shooting. No. 8 is the sight most in favour in South Africa—it is good for game or target shooting. No. 13 is a protected bead fore-sight for use with this or any other sight when target shooting. It is fitted with a vernier gauge for making wind allowance, and has game (11) and night-sights (12) interchangeable with the target-sight on the same block, and immediately adjustable. No. 6 is the 'Beach' combination fore-sight; when the hooded bead is turned down upon the barrel a pyramid or barley corn is raised in its place. No. 10 is the Lyman orthoptic back-sight much used on miniature match rifles, and No. 9 the favourite form of fore-sight for use with it. No. 7—A ringed-bead, is one as shown in the illustration on page 84, where the ring is seen surrounding the bull, which appears as a minute dot. If the shooter is not restricted to military sights, he will find that the proper use of one of these forms of target-sight will greatly improve his performance at the butts and in the field.

CHAPTER VI

TO HIT THE MARK

THE rifle is an instrument for the conversion of one sort of energy into another. The latent potential energy of the charge of explosive is realised in the mechanical equivalent, heat, generated by the combustion of the fired charge. A part only of this energy is the effect obtained by the movement imparted to the projectile, and the stress upon the gun. The stresses upon the barrel and breech, the friction upon the barrel, and such effects of the combustion as affect the projectile whilst within the barrel, are comprised in the term internal ballistics, which, excepting the motion of the rifle, do not concern the shooter, but the makers of the rifle and ammunition. These, with the help of scientific investigations, have ascertained so much respecting the action of weapons and loads, that they have reduced the usual results to uniform performance, so they become a series of 'constants,' which either neutralise each other, or demand of the shooter only a fixed allowance for error. Recoil, with its secondary movements, 'jump' and 'flip,' will be mentioned later. The rifleman who wishes to know how the ex-

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SHOOTING 'OFFHAND.'

ploding of a charge within a gun-barrel moves the projectile from a state of rest to progress at a high speed, should consult chapter xxiii. of *The Gun and Its Development*, which may be seen in any reference library, or study the subject at greater length in the official *Text Book for Small Arms and Ammunition*, and similar publications.

Just as 'internal ballistics' comprises all that tends to impart motion to the bullet, so 'external ballistics' is the term used to signify the conditions that modify the flight of the bullet and bring it again to a state of rest. So much is included—nearly all that pertains to scientific gunnery—that only what is elementary can be treated here. For a knowledge of the general principles and details of their application to shooting with the rifle, the reader interested in the why and how of the art must again be referred to the works above mentioned, and to the first 250 pages of Vol. II. of *The Modern Sportsman's Gun and Rifle*, by the late Mr J. H. Walsh, where he will find much lucidly explained and still more suggested. Such matters as are really indispensable to good practice with the rifle will alone be mentioned here.

As soon as a bullet leaves the muzzle of a rifle it is attracted to the earth by gravitation. If, at the time of departure, the axis of the bore of the rifle-barrel be parallel to the surface of the soil, and a bullet be dropped directly from the muzzle simultaneously with one shot from it, both bullets will touch the earth at the same instant; one directly under the muzzle, the

other at such distance from it as the velocity of the bullet carried it in the time. To increase the velocity is to increase the distance, but to increase the distance to the utmost it is necessary to increase the time, which is accomplished by directing the bullet away from the surface instead of parallel to it. The extreme range is obtained by making the angle of departure more or less than 35°, according to the shape of the projectile.

The force of gravity alone causes the bullet to describe a curve during its flight; but this curve is sharpened by the resistance of the air, because, as the velocity becomes less, the bullet travels less in each successive fraction of time, whereas the force of gravity is acting constantly. The resistance of the air varies with differences in the sectional area, shape and velocity of the projectile, and the density of the atmosphere—in the nature of things, therefore, it is inconstant, and the marksman must allow for its observed variations.

To the artillerist, the gunmaker and those interested in overcoming natural difficulties in order to produce more effective weapons, this matter of air resistance is of greater moment than to the shooter. It has already been ascertained which form of projectile offers least resistance, and possesses greatest advantages. The increase of resistance to increase of velocity is fairly regular, but no law has been discovered which exactly accounts for its degree of variation; for practical marksmanship its action is neutralised by attempting uniformity in the ammunition used from the one rifle. So,

too, the retardation of the bullet varies according to the power of the projectile to overcome resistance by reason of 'sectional density' (the relation existing between the weight of the bullet and the area of its cross section), which again may influence the shooter in the choice of rifle and ammunition for any given purpose; but with any one rifle, charge, and bullet, is a 'constant.'

As it is necessary to elevate the muzzle of the rifle in order to get range, in practice the axis of the bore is never parallel to the line of aim. The angle it assumes at any elevation is termed the angle or line of departure — formerly, line of projection — and is calculated from the degree of elevation given to the rifle; but the real angle of departure is sometimes more than that of the elevation because of the 'jump' of the rifle before the bullet leaves the muzzle. Whatever the angle of actual departure, the bullet at once falls away from the line, owing to gravitation, even as it would if fired in the horizontal plane, and although it mounts it never takes a straight line in the vertical plane, and the curve it describes between the muzzle and the first point of impact is termed the *trajectory*.

The range is theoretically the distance from the muzzle to the second intersection of the trajectory with the line of aim; in practice, the distance of the target, or mark, from the rifle. The extreme range, the utmost distance to which the bullet can be made to carry, was formerly termed a gun's 'random.' The trajectory of a certain bullet, with a certain charge, from a certain rifle, is loosely termed the trajectory of

the rifle, which is apt to be confusing when applied to other weapons than some military rifle of regulation pattern and with the service cartridge. The trajectory at short ranges with sporting rifles departs so little from the line of aim that, from the muzzle to the distance where the deviation becomes sufficiently noticeable to be allowed for by altering the elevation of the sights, it is termed the point-blank range. With the Martini-Henry rifle and service ammunition at 1000 yards' range, the elevation required is about $3\frac{1}{2}°$—equals 35 'degrees'—so that if the line of departure were continued to the distance of the target, the point to which the bullet was actually first directed would be over 175 feet above the line of aim at the bull's-eye, but, as during the $3\frac{1}{2}$ seconds required for the flight of the bullet it would drop about 186 feet, the 'jump' of the rifle must increase the real angle of departure very considerably for this to be the correct elevation. The highest point reached by the bullet would be at about 600 yards from the muzzle, where it would be nearly 47 feet 9 inches above the line of aim. The Lee-Enfield, with its greater velocity, would, when fired at the same range, reach the culminating point of its trajectory at about the same distance from the muzzle, but the bullet would be only a trifle over 25 feet above the line of aim.

When the trajectory is known and the distance of the mark also, the elevation may be correctly calculated, and this added to the *zero* of the rifle will enable the shooter to hit the level of the mark if proper allowance

is made for the temporary and local variants, if any, and the 'constant' due to personal error in sighting or firing. Elevation is always a sufficiently difficult matter to determine, and cannot, of course, be fixed exactly if the range has to be estimated. To show what perfection has been attained, it will suffice to instance highest possible scores—all bullets striking a 36-inch bull's-eye at 1000 yards—Mr Gibbs's record of 37 successive bull's-eyes at this range, and the late Sir Henry Halford's 18 out of 20 shots into a 12-foot by 9-foot target at 2000 yards. Such shooting represents the best that the match, or long-range target, rifle is capable of accomplishing. It is a magnificent result, and the more one knows of rifles and ammunition and the way in which motion is imparted to the projectile, the more astonishing does such accuracy appear. It is not surprising that the enthusiastic rifleman terms the rifle a 'truly noble weapon'; the difficulties the manufacturers and mathematicians have overcome are of no mean order, and although better weapons and better shooting may be obtained in the future, the shooter will be a proud man who passes the present record.

The trajectory curve shows the impossibility of uniting the longest range with 'point-blank' firing: so rifles are classified according to the purpose for which they are to be used. In sporting rifles a long point-blank range is a desideratum; for target practice a high trajectory is not inimical to accuracy; the military rifle sacrifices part of the accuracy and range of the

target rifle for such qualities possessed by the sporting rifle as will constitute it the most efficient weapon.

Before treating of the methods of ascertaining the requisite elevation to insure accuracy at different ranges, it will be advisable to explain certain results of firing. The explosion of the charge is of the nature of a blow upon the barrel, the base of the bullet, and the face of the breech-bolt. This causes the barrel to vibrate, forces the bullet forward, and, by as much as the air resists the forward advance of the bullet, the rifle to recoil. The vibration of the barrel produces what is known as 'jump' and 'flip'; deflections of the muzzle in the vertical and horizontal planes respectively, and *before* the bullet quits the barrel. The shock starting at the breech-end, where the barrel is expanded by the pressure of the explosion, causes the muzzle first to dip, but it recovers and is raised above the nominal level before recovering stability. If there be any movement of the rifle by recoil, this also will tend to throw up the muzzle. Whether or not a rifle recoils before the bullet leaves the barrel depends upon the length of the barrel, the charge, the weight of the bullet in relation thereto, and its weight in relation to that of the rifle. So far as at present ascertained there is with some cannon and small arms no observable motion of the weapon before the bullet leaves it; with others 'recoil' has been observed. For the shooter the only matter of real importance is the exact position of the muzzle at the time the bullet leaves it, for it is that which gives the projectile its

angle of departure. In short, to calculate the required elevation for any range, beyond 'point-blank,' it is necessary to ascertain the *zero*. Ordinarily this is done by the manufacturer, who marks the sights for different distances accordingly. The shooter may test the rifle himself by proceeding as follows:—

'Place a penetratable target at 12½ yards' distance, put on it a bull's-eye about one-third of an inch in diameter. If the target be exactly 12½ yards distant from the muzzle when fired point-blank, with the sight at zero, the bullet should strike below the spot aimed at as much as the centre of the bore is below the centre of the fore-sight taken, plus one-eighth of an inch the fall of the bullet by gravitation in that distance. An eighth of an inch at 12½ yards equals 1′. of angle. If the height of the sight above the axis of the bore be 1⅛ inch, then if the shots hit 1¼ inch below the centre of the spot aimed at, the zero of the scale of the sight would be correct; if only seven-eighths of an inch below the centre, the zero is favourable, by the difference which is 3′, the difference between seven-eighths and 1¼ inch; which difference will have to be subtracted from the elevation given in the tables for the different ranges; if the shots fall below this, the error will have to be added to the scale.'—*Halford.*

The shooter, having ascertained the zero of his rifle, or what, to him, is the same thing, that his method of shooting it necessitates a change in the sighting scale of elevations, all that the shooter needs to do is to add or subtract the difference, if any, and maintain the same

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zero. If the rifle be shot with a bayonet upon the barrel it will make a great difference; a difference will result if the ramrod be not in its place, or even projects; if the bands are screwed up too tight, if the fore-end warps, if the rifle is fired from a rest, even from a bag of sand; if the same grip be not maintained, and some difference will doubtless be noticed in the zero when firing offhand, kneeling, prone, and in the back position —the difference, if observable, must be allowed for regularly, and all the results of recoil, jump and flip, overcome by such frequent practice that they are a constant and uniform item of the calculation, not a variable one, such as are due to local causes—weather, altitude—or remediable, as fouling of the barrel by repeated firing. The method of correcting the elevation to allow for all modifications of the trajectory will be stated later; first, it is necessary to explain the flight of the bullet in the horizontal plane.

Rifling causes the bullet to rotate on its axis, and the speed of this rotation will depend upon the quickness of the twist of the rifle. If, as in the Lee-Enfield, it is one turn in 10 inches the bullet will continue to make one turn in each 10 inches of its trajectory, for the retardation of the rotation by atmospheric friction is less than the retardation of speed by the atmospheric pressure against the bullet in the line of its flight.

One result of this rotary motion is to cause the projectile to take a horizontal curve; if the rifle has a right-handed spiral, the bullet will rotate its way towards the right; if a left-handed spiral, as have the Lee-Metford,

Lee-Enfield, and some match rifles, then to the left. This curve increases as the range increases; it is not noticeable at short distances, but at 1000 yards it is, with the Lee-Enfield about *three and a half feet.* The cause is variously accounted for, being generally attributed, so far as four-fifths of it are concerned, to the bullet in falling getting more grip of the denser air below than it has upon that above and so rolling itself off to one side; the other fifth being attributed to the rotation of the earth, and constant, irrespective of the direction in which the shot is fired. With a spiral to the left there is less drift than, other things being equal, there is with a spiral to the right. It is further neutralised by the tendency to pull over the muzzle to the *right*, when pressing the trigger, and by the rifle recoiling against the right shoulder giving the muzzle a 'jump' to that side, so the left spiral may be the best for long-range rifles.

For some occult reason the service arm has its lateral zero adjusted to compensate for drift at 1000 yards, consequently at mid-ranges, say from 400 to 800 yards, it throws to the left owing to the fore-sight being placed 0.023 inches to the left instead of in the centre. The rifles with which the troops were sent to South Africa were wrongly sighted, and the error had to be hurriedly remedied by supplying a quarter of a million new leaves, or sight bars, to bring the line of sight parallel to the axis of the barrel on the horizontal plane.

The rolling off of the bullet being practically always the same, this 'vertical drift' may be allowed for at

the long ranges, but there is a 'lateral drift' due to the rotation of the bullet against wind pressure. For instance, with the Martini-Henry and its right spiral, at 1000 yards it is necessary, with a gentle wind from the left—nine o'clock—to allow twice the windage necessary for a wind of the same velocity blowing from the right—three o'clock—but with stronger winds the difference is not so great. The Lee-Enfield, on the contrary, requires greater wind allowance for a three o'clock wind than for a nine o'clock, but yet not so great a difference between easterly and westerly winds as the Martini requires. The actual differences are shown by the tables in the Appendix.

CHAPTER VII

THE EXPERT MARKSMAN

EXCELLENT shooting at fixed and moving objects is to be made by anyone who can hold a rifle steadily, and work conscientiously by rule of thumb, observing the results alone and finding out by practice the correct allowances to be made at different distances and with varying conditions. Of far greater interest does rifle-shooting become to the marksman who attempts to discover the reasons why the flight of the projectile ordinarily takes the course it does. Much has been learned of external ballistics since the ingenious Mr Robins published his *New Principles of Gunnery* in 1742, but very much still remains to be known of the science. When the sixth edition of my book, *The Gun and Its Development*, was issued in 1896, an ignorant critic who reviewed the work for the leading technical weekly recommended me to read a blue-book, from the latest edition of which I had quoted. To that same blue-book a leaflet was issued in 1898, cancelling those pages referring to the matter in question, and substituting a quite different theory—which last certainly more closely agrees with the results as at present ascer-

tained, but is not wholly satisfactory, since it leaves part as yet unexplained. Again, it is almost an axiom of the text books that 'every bullet must begin to fall the instant it leaves the muzzle of the rifle,' because of gravitation. Already I have used the same argument, because needful to explain why the angle of flight does not correspond with the angle of projection or departure. Now 'flip' and 'jump'—taken as a result of the vibration of the barrel before the bullet leaves the muzzle—although constant and regular with the same shooter shooting in the same way—vary with such slight modification of any conditions as to obscure one departure of the bullet from the calculated line of flight. I refer to the 'lift' of the bullet by air resistance—a matter, so far as I know, not yet discussed by scientific experts—which is noticeable in the .303 service rifle, and, probably, to even a greater extent in rifles of the same class firing lighter bullets at even higher muzzle velocities. To me the fact seems to be more easy of explanation than actual demonstration. So far as my own observations go, the zero of the .303 rifle as ascertained by firing at 12½ yards is lower than that ascertained by firing under like conditions at 100 feet. Of course divergences from the calculated true line of flight would be attributed to personal error in aiming the different shots. If accurately centred screens are used to determine the trajectory, it may be said that the contact with the first screen deflected the bullet, but a series of shots all corresponding should most conclusively determine the average amount of 'lift' at given

ranges. Possibly, also, Professor Boys, who has been able to photograph bullets in their flight, may be able to devise some mechanism which will demonstrate the rise of the bullet.

The explanation, of course, is that the rotating bullet, no matter at what angle fired, is not parallel to the initial line, but has its axis tangential to the trajectory curve; that is, is lower at the base than the point. Consequently, it is an aeroplane so far as its progress forward is concerned. Just as the wind rushing past a kite causes it to rise, so the bullet rushing through air, which is more dense below than above, floats upon it. If the difference in the density of the air is sufficient to cause vertical drift, and in cross winds lateral drift also, it is much more likely to produce an elevation of the bullet.

If markmanship were the sole aim of shooting, this point would be of little importance; but rifle-shooting is more than this. From rifle-shooting, and experiments in connection therewith, much that has improved the arm of precision as a weapon of war has already been derived, and I wish to point out that the end is not yet. With a lighter projectile and a much higher muzzle velocity, the effective point-blank range is increased; with the .236, having 2500 feet velocity a second, it is over 750 yards, and possibly, by modifying the form of the bullet, and studying the means by which it may be caused to float on the air as well as penetrate it, a much greater point-blank range will be attained. My sole object in mentioning the subject here is to attract

the attention of rifle-shots to possibilities of increasing the efficacy of the weapon, and to beg them to direct themselves to that end. For the benefit of critics I may say that it is needless to refer me to Professor Bashforth's experiments in relation to vertical drift. I have already studied them.

Practical target work, which is not based upon 'rule of thumb,' relies upon observation, but, owing to a more complete knowledge, makes better deductions therefrom. If it is the correct elevation for a given range that has to be decided, it may be ascertained by calculation alone, but as the 'blue-book' gravely states, 'It would not be safe to rely upon the formula for distances much beyond those for which the angles have been experimentally determined.' The scientific shot uses numbers and degrees of an arc to express variations in elevation or lateral allowance; the ordinary shot used by means of a vernier gauge to raise the sight-bar by the hundreths of an inch; he does so now by hundred-and-fiftieths, because that most nearly corresponds to 1′ of an arc. The data for elevation and wind allowances are given in most scoring-books, and useful tables of the general variations are added in an appendix for reference, but, with respect to all, it must be said that different individuals will require to make different allowances therefrom.

The merely efficient 'marksman' in the military sense is not expected to concern himself with those problems connected with rifle-shooting which the expert sharpshooter ought to attempt to solve. The rifleman should not only observe closely any variation in his shooting,

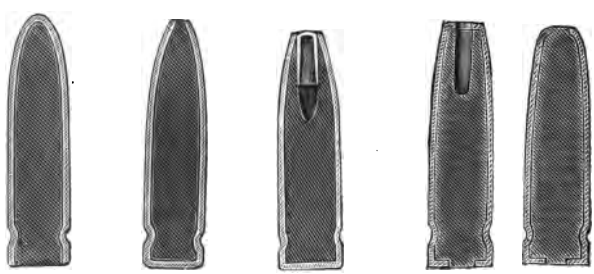
but trace its cause and know how to apply the necessary correction—by allowance—when found. One of the first 'variants' to be encountered arises from differences in the ammunition. I remember contracting for a number of service rifles, and when the first delivery was made the agent of the purchaser contended that the sighting was wrong. I then gave one of the rifles to an expert shot, and with it three packets of ammunition—one from the Royal Laboratory, one from Messrs Eley Brothers, the other from Messrs Kynoch. He shot the rifle, and had three distinct groups of shots on the paper target, so the supposed error in the sighting of the rifles was disproved, and the right ammunition selected and purchased by the buyer of the rifles. This variation is of course distinct from that in the cartridges of the same make; the allowable variation in such being sufficient to make of any bull's-eye an inner; a *defective* cartridge may cause the target to be missed. The expert shooter should recognise quickly a shot due to a variation from the standard ammunition and the remedy to be applied. Next, he may practise with bullets of different forms and weights—even for the .303 there are many kinds available—and the experience so obtained will not only increase his confidence but induce him to make other experiments, from which perhaps all may learn something.

The jacketed bullets for the service rifles, of which sectional views are shown, are:—A, the original .303 Lee-Metford of 215 grains, the nickel jacket covering the point but not the base; B, the Tweedie bullet of

215 grains, with the base covered by the jacket and the point exposed; C, the hollow-pointed, copper-tubed bullet of 195 grains, for game shooting; D, the new service bullet, 'Mark IV.'; E, the service bullet known as 'Dum-Dum.'

The following items of information may be useful to beginners at long-range target shooting.

A 'degree' on the vernier scale of 150ths is not the 360th part of a circle, but a minute of angle (nearly) the



BULLETS FOR THE SERVICE RIFLE.

21,600ths part of a circle: exactly, $1' = 1.017$, 150ths, the distance between the sights of the service rifle being $23\frac{5}{16}$ inches. Each 150th, whether for wind allowance or elevation, made on the back-sight equals 1 inch on the target at 100 yards, 2 inches at 200 yards, 5 inches at 500 yards, 10 inches at 1000 yards, and so on.

The allowance to be made for increased distance is usually 10°, or 150ths, on the back-sight for 600 yards—beyond the elevation necessary for 500 yards; 11° for

the difference between 600 and 700 yards; 12° for that between 700 and 800, and so on, adding *one more* to the former allowance for each 100 yards, and two to each 100 yards beyond 1000 yards.

Temperature affects elevation—it requires to be higher for cold and lower for heat. Take 60° as the standard average temperature, and deduct from or add to, according to the following formula:—Multiply degrees in excess or below by the initial figure of the distance in yards and divide by ten; add to the elevation if the temperature is minus, deduct from if a plus. Example:—Temperature 90° F. at 500 yards' range; then $30 + 5 \div 10 = 15$ *yards*, which deduct from the distance, and elevate as for 485 yards.

Barometric variation is so slight that it may be discarded, save in extreme cases. One inch of barometric pressure is equal to 15° F. change in temperature. Treat a rise of the barometer as a rise of the thermometer in the above proportion. Vary for altitude by the corresponding variation in barometric pressure. Elevation must also be varied in accordance with the variations in the force and strength of the wind.

The rifleman uses the dial of a clock as the means for indicating and recording the *direction* from which the wind is blowing. He is at the firing-point—the centre of the dial—and faces the butts—twelve o'clock, so a wind directly from behind him is a six o'clock wind; one straight across from right to left a three o'clock; one from the left front a ten or eleven o'clock wind, and so on all round the dial. Note that to compensate for

drift with a right wind the .303 service rifle requires a greater allowance than for a left wind of the same velocity; rifles having a quick spiral in the opposite direction require greater allowance for left winds. *See* Table in Appendix.

The force of the wind is usually gauged by the position of the pennants from the flag-poles on the range, from the vane on the flag-staff, or by one of the ventométers on the range, if possible. They are otherwise more generally and loosely recorded as—

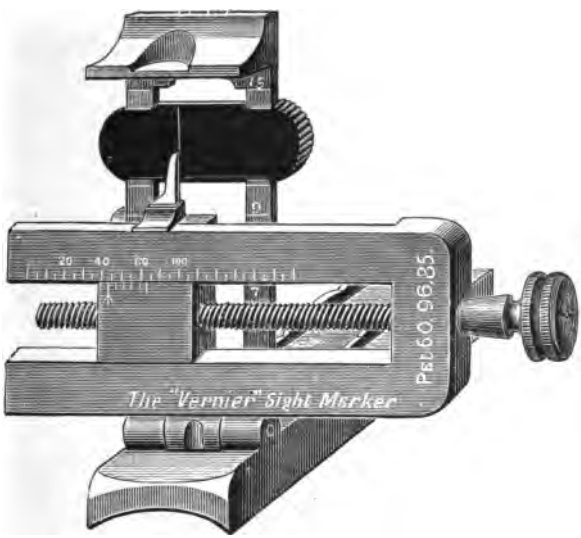
Very Gentle Breeze	for a wind	about	4	miles an hour
Pleasant Breeze	,,	,,	10	,,
Fresh Breeze	,,	,,	18	,,
Strong Wind	,,	,,	26	,,
Very Strong Wind	for a storm	,,	36	,,

Elevation must be increased for all head winds, lowered for rear winds. For six and twelve o'clock winds the rule is to multiply the velocity in miles the hour by the initial figure of the distance and divide by four, which will give a product in *yards* to be added to or deducted from the actual range.

Changes of allowance for wind are made by marking the bar of the sight with a perpendicular line, the position of which having been calculated is measured by a vernier and drawn with a white pencil. Match rifles have a transverse travel, and the standard and aperture are moved in accordance with the vernier gauge attached, either to right or left.

Variations in light do not affect the trajectory of the bullet, but as they do cause errors in taking more or less

fore-sight, and in locating the bull's-eye, the variation is tantamount to an increase or decrease of elevation, and should be allowed for accordingly. Usually, if the sun so shines as to light up the sights of the rifle but not the targets, or if the targets be overcast by a passing cloud, a higher elevation is required; on the contrary,



GREENER'S VERNIER MARKER, USED AS ELEVATOR AND VENTOMETER.

when the targets are lighted up, or the firing-point is shaded, a lower elevation is indicated. The amount will depend upon the degree, and also upon the eyesight of the shooter; it is generally the rule that the better the light the less the elevation requisite.

Mirage is due to the heat rising from the earth, and its effect is to obscure the target. Sometimes it is observ-

able at the bottom edge of the target, serrating the line, at others it will be seen most distinctly at the top. It not infrequently accompanies a slight breeze across the range near the butt, and then the image of the target follows the direction of the wind, and the real target will be some feet to windward of its apparent position. A strong breeze will disperse mirage, so will a cloud shading the whole of the range, or from the firing-point to more than half the distance from the butt. It is *not* dispersed by a cloud shading the targets only; its effect then is to make them apparently lower than they are, and this same effect is usually the result of a mirage increasing in intensity; so, on the other hand, the targets apparently rise as the mirage decreases. It is necessary to allow for mirage, and the rule is to give greater elevation, though there is no scientific basis for this. Sometimes the reverse is indicated and necessary, but more often than not mirage is accompanied with such other atmospheric changes, which have to be allowed for, that the *nett* result is the normal allowance. If mirage varies in direction it is advisable to alter the allowance in the same direction, and, whilst the change is in progress, it may be necessary to take a different elevation or wind-line for each successive shot.

Refraction is closely allied to mirage, usually accompanies it, is due to similar causes, and the result is that of mirage—in so far as the targets are apparently displaced and distorted. The principle is that which causes an oar or stick dipped under the surface of the water to appear crooked, and to be where it is known it

is not. There being no line of demarcation in the air, as there is between the surface of the water and the air —refraction may make the targets appear where they are not, and that there is refraction will not be known. The expert shooter, by continual observance, will have other indications that suggest its existence. For instance, if the sun is setting behind the butts; as the light decreases, the butt and targets will seem to diminish in size. The light from the sun is not directly reflected from them, but from a reflection of that light from cloud or sky in front of the butt. Here again it is usual to give greater elevation, but with some shooters certainly the reverse is required, as to them the targets appear higher than the real position, and consequently the shots go over the targets. If atmospheric conditions be closely observed and carefully noted in the register, the shooter, by thinking the matter out from the results of previous shootings, will soon find out how to make an approximate allowance.

The best are not always quite successful. Captain Foulkes cites an instance of picked men from the International teams on one occasion being baffled completely. The sun was bright, no wind, distance only 500 yards. There was just a perceptible drift of mirage varying in direction. When from the left the bull's-eye appeared elongated to the right, when from the right elongated to the left, when at times there was no drift, the bull's-eye appeared to be of the shape of an egg standing on end. Result: some of the best shots in the English and Scotch teams made only 27 points out

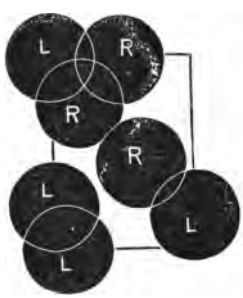
of 35. It must also be remembered that some are more susceptible to change of light than are others. Ordinarily it is the man with the finest, clearest, keenest eyesight that is most troubled—often disastrously influenced by changes so slight his duller-visioned competitors cannot distinguish them. The field-glass will often show mirage unobservable to the unaided eye; the shooter must learn to observe quickly and not be led to peer too often or too long through the binoculars to the detriment of his shooting. Expert shots invariably take care of the eyesight, and in a glaring sun wear smoked spectacles until the hour approaches for their turn at the target, and thus go to the firing-point with the eyes fresh and strong, unwearied by staring about in the glare of a mid-day sun. It is a truism that much belongs to everything; *everything* seems to belong to rifle-shooting, from the rotation of the earth to the luncheon *menu*. The subject cannot be exhausted, and the sport and practice have always something fresh to reveal.

The best schooling is actual practice in competition with experienced shots; the beginner and the experienced alike should most accurately record the result of their performance in the best procurable register, filling in all essential particulars. The opposite extreme is to pay so much attention to the records and recording, that passing changes of light, wind, etc., fail to be observed at all. The next thing is to note carefully all variations from your usual form, and, if your average is improving, find out why and persevere in that direction; if, on the contrary, it is falling away, make such trials as will

enable you to determine whether the rifle, the ammunition or the shooter is at fault, and apply the correct remedy. In any event, if the register be accurately kept, some divergences are sure to be observable, and it is from these that most may be learned. Of course there is always the possibility of a bad cartridge, and even with the best cordite ammunition and the service rifle the allowable variation in muzzle velocity—80 feet per second—is of itself quite sufficient to account for an occasional miss of the target at 1000 yards' range, and to make a shot drop from the bull to an outer at 500 yards. For the practical purpose of target shooting simply, it is probably more beneficial to base changes in elevation and wind allowance upon previous experience, but in case any wish to construct tables of angles upon Mr Metford's plan, I reproduce the formula.

The angular value of the drop *in vacuo* is ascertained by the gravity formula: fall = 193 inches × time ^{2}. For a speed of 1300 feet per second this is 9′.35 for 100 yards. If there were no retardation by atmospheric resistance it would suffice to multiply the angular value by the distance. The specific gravity and shape of the bullet require to be taken into account also; if of lead and cylindro-conoidal, it may be taken as an increment of 1′, that is .9 of a minute for each 100 yards of distance up to 2000. By adding the first value to the second the proper angle is obtained from the next 100 yards, when the like addition must be made, and so on, always adding the increment to the ever-increasing sum of the angular value at the preceding range.

When so accustomed to the rifle that its use 'becomes second nature'; when putting it up sharply without looking *for* the sights, upon looking *at* them they are found to be properly aligned upon the mark, it will be possible to hit moving objects. This accomplishment really depends upon the true automatic functioning of finger, eye and brain. It is necessary only to *look at* the object it is intended to hit—never look for the sights, or the object will be missed. Really the action must be



SEVEN SHOTS FROM A W. W. GREENER NO. 1 EXPRESS 100 YARDS. (ACTUAL SIZE.)

done correctly by intuition. Just as one, to catch a moving object, stretches forth the hand without looking where the fingers are, but regarding only the object to be clutched. It need not be said that much practice is necessary in order to obtain great skill and exactitude, but success is not so difficult as many think. A trial will soon prove this. The judgment of the distance and speed at which the object is moving depends upon the result of previous observation and practice. Shoot quickly at a fixed target, or better, at a vanishing one, to

find out where the bullets strike, and having attained fair skill in making bull's-eyes at such marks, the hitting of moving objects will come with experience, providing that the shooter does not hinder natural action by attempting to align the sights with the same careful precision he should observe when shooting at the target under ordinary conditions. The shooting from double-barrelled rifles is not so accurate as possible from single rifles of same calibre, but good field work can be obtained from them at sporting distances.

CHAPTER VIII

KNIGHTS OF THE TRIGGER

THE rifle, apart from its natural achievements, is credited with wonderful powers by writers of romance, and even staid historians. In the early days of its use such things were accomplished by expert shots that people were astonished, and gave the notable, yet possible, exploit an ornamental exaggeration which, in these days, causes the whole account to be disbelieved. There is more than one old church weather-cock which testifies to the skill of early marksmen; if that with the figure 9 made by the holes of as many bullets fired at it in succession is mere legend, the old vane of St Martin's, Birmingham, still testifies to the skill, or luck, of the rifleman who pierced it by a shot fired at it from the Bull Ring during the present century.

Probably most of the stories had a solid basis of truth, but the recountal of a simple fact which would interest the rifleman was magnified as to distance in order to startle an ignorant and not easily impressed audience.

In this matter-of-fact, scientific age, it is recognised

that no series of less than ten shots can be accepted as conclusive evidence of the accuracy of the rifle, and that the close grouping of a series at one range is not absolutely trustworthy evidence of another group fired from a greater distance. So far as the rifle and marksmanship are concerned, Mr A. C. Gould declares that five consecutive shots have been placed within 1.41 inch at 200 yards; 'there have been nearly a hundred ten-shot clean scores of bull's-eyes made in offhand shooting, but no one has been able to place ten consecutive shots on or within the centre of 3.36 inch in diameter; in rest shooting no one has been able to place ten consecutive shots on, or within, the circle 1.41 inch in diameter, though the highest possible score was so often obtained when using the 3.36-inch centre that the sport became uninteresting. It is considered brilliant shooting to place all ten within the circle of 2.33 inch, and fine work, even if in the 3.36 inch.'

In America there is now little target-shooting practice beyond 200 yards, except with military rifles. With these, at 500, 600 and 800 yards, five shots within the 8-inch bull's-eye is a common performance; a string of seven, not so common; of ten, made but seldom; a longer series is considered quite remarkable. In 1875 the American rifle team first appeared at Wimbledon; two years later some excellent shooting at long ranges was recorded; but in 1882 the American long-range rifle fell to a subordinate position; it has never recovered the lead, and even in the United States

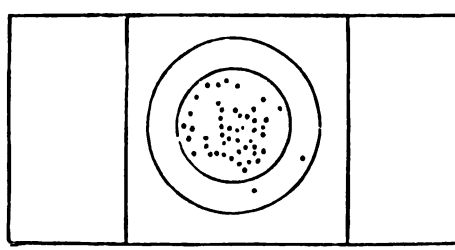
long-range shooting as a sport appears now to have been quite superseded by the Continental method, with ring targets, heavy rifles and medium ranges.

It is in long-range shooting that the British are ahead of all competitors. As long ago as 1877, Mr J. K. Milner, of the Irish team, when in the United States, made a highest possible score, fifteen consecutive bull's-eyes at 1000 yards. In 1880 Dr S. J. Scott made 74 out of a possible 75 at 1000 yards for the American team on a visit to Dollymount. In 1892 both Captain Gorvan and Private Boyd scored 74 out of a possible 75 at 1000 yards in the Elcho Shield competition. In 1894 Captain Gibbs scored 71 out of 75 at 1100 yards. The best authenticated score, though not made in a competition, is that of Captain Gibbs, who, in fifty consecutive shots at 1000 yards, scored 248 out of a possible 250, including one series of 37 consecutive bull's-eyes. Mention must also be made of the grand performance of Sergeant E. A. Wood of the South Stafford, who made a highest possible at Bisley in 1899, at 200, 500 and 600 yards, and had also bull's-eyes for sighting shots. Mr Wood is the son of an expert gunsmith, who for the past forty years has been in my employment. For a time Sergeant Wood was also with me, but, apprenticed to a different trade, he has been most deservedly successful in that as in marksmanship. I instance the case because it shows that practice and success with the rifle may be enjoyed by all, and also that the time requisite for the attain-

ment of efficiency is no bar to success in any business or profession.

With the old military match rifle, plain open sights, no wiping out of the barrel, one of the best, if not the best recorded score, is that made by Major S. S. Young at Hounslow in 1879—68 out of 75; 10 bull's-eyes, 3 inners, 2 magpies.

With the .303 rifle, the late Sir Henry Halford scored a highest possible in the Doyle competition



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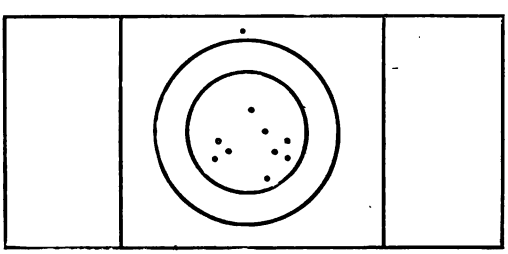
of the 13th Middlesex Volunteers, who made ten bull's-eyes with eleven shots—including the 'sighter,' a bull—at Staines in the South London, July 1898. The fourth shot was an outer, owing to change of light, the time being sunset, weather dull, and wind scarcely perceptible.

That these scores have never been surpassed, if equalled, proves that there is still ample opportunity for the sharpshooter both in competitions at home and abroad. The men who can count upon hitting the



Sighter, 5—5 5 5 3 5 5 5 5 5—total, 48, out of 50 h.p.s.
SERGEANT FULTON'S RECORD SCORE.

36-inch bull's-eye with fair regularity at 1000 yards, with a rifle of equal accuracy and properly adjusted, ought to experience no greater difficulty in getting the same number of shots into a 2-inch centre at 200 yards—probably could do it much more easily.

There are many forms of competition, with game, military and match rifles; at long, short and medium ranges; offhand, kneeling, sitting, prone, or firing from a rest; at stationary and moving objects Any and all of these are practice for the sharpshooter, and skill in any one or more deserves honour; with success at these, the

expert will receive due homage, and also find beneficial recreation and a pleasant pastime. Other forms should be guarded against by all who wish to become 'sharp-shooters,' marksmen of recognised ability. Beginners particularly should firmly resist the temptation to become expert in 'fancy trick shooting.' Success in this comes easily enough to the man of average skill who cares to specialise, and disregard the legitimate and usual uses of the rifle. 'Trick shooting' is for the astonishment of the ignorant multitude. It, as often as not, consists in the accomplishment of some quite ordinary feat in an unusual manner. It is at a (comparatively) large object, at an absurdly short range; a performance of no practical value, but seemingly very clever to those who feel that they could not accomplish so much when firing in an ordinary position. It is merely a question of practice, as the shooter may himself ascertain by trying shooting from the hip at close range.

Driving in nails, splitting cards, cutting the bullet on the edge of a blade, exploding cartridges with a bullet fired at the base—if it hits anywhere it will suffice—are forms of shooting not to be recommended; since the same number of cartridges used at an ordinary target will teach the marksman very much more.

The shooting of professional stage shots is quite comprehensible to the expert—who despises such exhibitions. For instance, when shooting with the back turned upon the object, there is always a mirror, and through that to align the sights correctly is almost as easy of accomplishment as by doing the same with the

rifle to the shoulder instead of upon it. Objects thrown into the air are always shot at a very short range, 30 feet at the utmost; they are hit when they are at a standstill—the moment when the ascent turns into the descent, and usually they are thrown so as to do this when in line with one of a number of known—and by the shooter seen—points on the screen behind. If thrown up from traps, their flight is arranged with mathematical accuracy, so is really tantamount to little more than putting the bullet into a 3-inch bull's-eye at 10 yards—a feat a proficient rifle-shot may expect to accomplish at 200, if given the right rifle. To show the lack of such skill, as the professional stage shot exhibits, let the objects be thrown crossing and at about the height of his shoulder. It is, of course, impossible to break swiftly-thrown objects with a rifle ball, when the shooter is galloping past upon horseback. It is not impossible to snuff a candle at 100 or more yards, providing the shooter at that distance can be pretty certain of getting within 12 inches of the flame, and takes care not to shoot low. For preference take a large calibre rifle, which will make the feat look more difficult, but in reality easier of accomplishment, since it is the displacement of the air as the bullet rushes by in the vicinity of the lighted candle, which promptly extinguishes it. Akin to the 'tossed-up-ball' performance is that of hitting a card carried across the stage by an assistant; the woman—for it is generally one of the more docile sex that acts as a butt—by long schooling has learned so to march with measured pace, that there is a momentary

pause, unobserved by the audience, just as a fresh step is taken. Then it is that the shot is fired. The audience probably do not know that the orchestra is playing special music, and that both the 'Champion rifle-shot' and the assistant know the notes which signal the pulling of the trigger—and make natural the pause of the moving object.

This subject shall not be concluded without a protest against the 'William Tell' feat—the commonest and most dangerous of the stage tricks. In my scrap album are several records of 'accidental death' from its practice. Every rifleman, everyone who has read this book so far, knows that no rifle is perfect, and that owing to some inherent fault of construction, some fault in the ammunition, or in the thousand and one things which must be absolutely constant to ensure uniform result, sooner or later an erratic shot *must* come. It is as certain as death itself; the time of its coming as impossible to foresee. There is no need to attribute such occurrences to faulty marksmanship: the proper course is to avoid such practices as put life or limb in jeopardy. Perhaps it is but a finger-tip knocked off, a hand pierced, or a curl shot away—such minor 'accidents' are not always sufficient warning to either of the performers, nor can I expect that the experience of others will act as a more effectual deterrent. No sharpshooter should idly risk a shot which may endanger the life of another.

On the other hand it must not be assumed that all professional shooting is trickery or easy of accomplish-

ment. For instance, in 1878, Dr Carver undertook to break as many glass balls with a rifle as anyone else had done with a shot-gun. The record was held by Captain A. H. Bogardus, who in 5156 shots had broken 5000 glass balls in 500 minutes with a double-barrelled shot-gun. Dr Carver had already a record of 885 broken out of 1000, and determined to break 5500 within the same limit of time. He started at 11 a.m. on the 13th July, a broiling hot day, with a shower of rain soon after noon, fired 6212 shots, breaking 5500 balls in seven hours, thirty-five and a half minutes, therefore leaving him with a margin of twelve and a half minutes to the good at the finish, and a rest of thirty-two minutes taken after the third thousand had been scored. Owing to the hot sun, which was shining directly into his face most of the time, Dr Carver suffered so severely that he stated he was quite unable to see many of the balls, and the last thousand were broken sheerly by the force of habit. In each hundred some were missed, the lowest 2 misses—twice, the highest 28—once. On previous occasions he had scored 99 out of the 100, and subsequently has made a highest possible. In this match, in addition to the aiming, the work done shows remarkable strength and endurance. The rifles used were .44 Winchesters of 73 model—of which six were supplied. Each weighed 10 lbs. and had a recoil of 48 lbs., hence Dr Carver in the 'day's work' raised to his shoulder 62,120 lbs., or a little over 31 tons, and withstood in recoil an aggregate pressure of

298,176 lbs. or nearly 150 tons. In addition, to manipulate the lever—which travels very far—it is estimated that the shooter must have moved with his hand some 248,480 lbs. during the day. As is well known, Dr Carver would hit with a rifle bullet a coin or any other object thrown into the air, and at one time among shooting men in England a coin pierced by one of Dr Carver's bullets was the fashionable trinket for the fob chain.

Ira Payne, the great pistol-shot, was one of the speediest manipulators of the pistol-gun and rifle I ever met. He could, with a non-ejecting revolver, make faster shooting than Harry Webley, the fastest and most accurate revolver shot of the time, could accomplish with a self-extracting weapon. He made better shooting at his distances, up to 12 yards, but was outshot completely at 25 yards and longer ranges. Quick shot that he was, when he determined to challenge the Berlin public to compete with him with the Mauser, he first practised assiduously with this weapon, and after some hard training got to work on the stage. The scores I do not remember, but I saw him again and again defeated by casual comers, who scored higher for hits or points in time—whilst a few beat him both in hits and time—yet he won handsomely with the aggregate, and would, of course, have done even better if one shot, though the most accurate and quickest shot of all, had continued throughout, for as Captain Bogardus and others have discovered when attempting long matches, it is hard

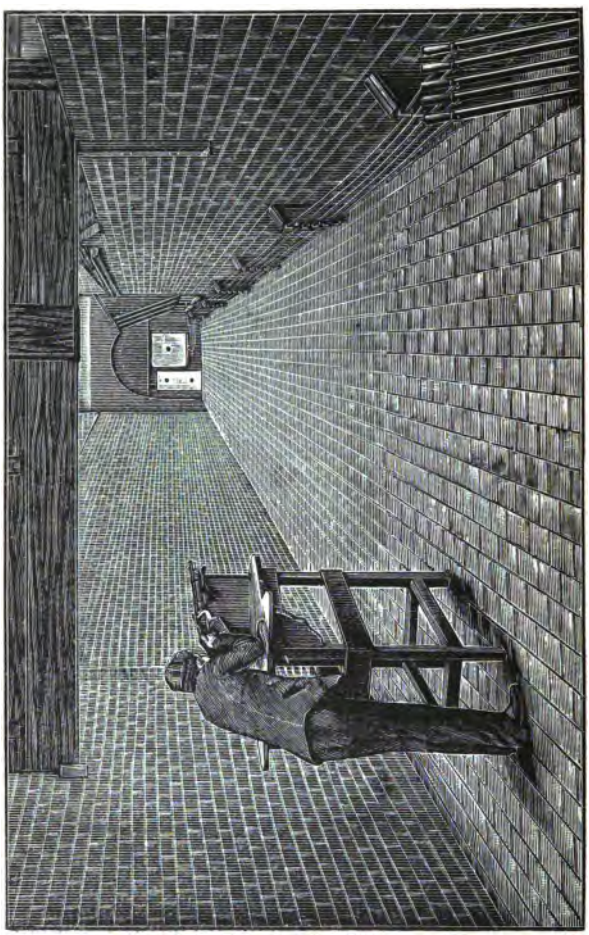
to keep up the quality of the markmanship as soon as fatigued, and that quickly comes when shooting beyond that number of rounds to which one has been accustomed.

To the beginner and to the proficient shot no better counsel can be given than that offered by the rifle's sturdiest champion, Mr A. C. Gould: 'Be content to shoot the rifle like a man, with butt to shoulder, at regulation distances, and, my word for it, you have quite as much of a task as you can accomplish in a lifetime if you essay to become a first-class shot.'

CHAPTER IX

RANGES

RANGES for rifle-shooting may be either open—in every way the best—or closed, suitable only for practice at short distances. As the service rifle has an extreme range of over two miles, it is almost impossible to secure a range which shall be safe in all conditions, such as, say, the accidental discharge of a rifle at the firing-point, but in another direction than towards the butt. For this reason, if for no other, the tyro should first learn to use the rifle in a protected range. Even experienced shots will occasionally miss the butt, so the danger zone behind it, as well as on both sides, must be secured. The land required for a safe open range with the service rifle is of such great extent that an ordinary club cannot expect to afford such. In the neighbourhood of large towns they are quite beyond the resources of the local Volunteers, although they have special facilities for raising a Government loan for the purpose. In short, to encourage practice with the service rifle, the Government ought to provide many public ranges within convenient distance of the great towns, and not strain the pecuniary resources of the Volunteer fund, or expect 'local enterprise' to fur-



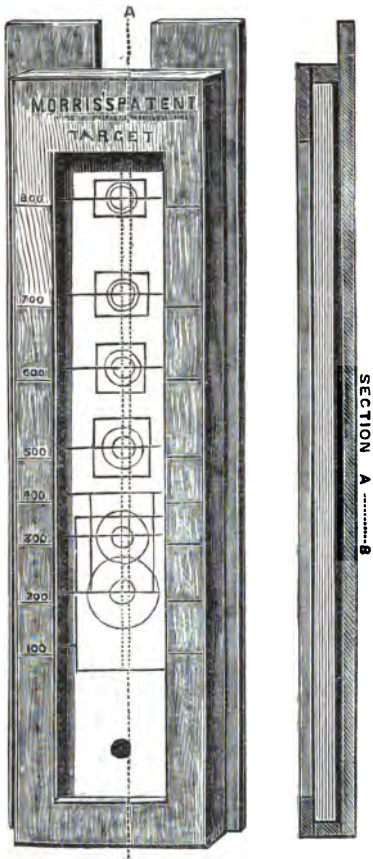
PROTECTED RANGE AND GUNMAKER'S RIFLE-REST.

nish ample accommodation throughout the length and breadth of the land—which is a national requirement. It is a trespass at law even to shoot over land—a stray bullet, though not doing any actual damage, may lead to unpleasant and expensive developments if it crosses the fields of a hostile occupier. The Government has special methods of obtaining way-leaves, and for this reason alone the private individual should not be expected to secure with difficulty what the Government may obtain with greater facility.

It may be mentioned that every citizen has the right to shoot—that he may shoot at fixed marks, and birds and beasts not scheduled for protection by any Act, on any land, if he has the consent of the occupier. For this a gun licence is not necessary, since no officer is empowered to enter upon private land in order to demand it. But a gun licence is required to carry fire-arms along public thoroughfares, or to use them at any place to which the public has access. It is possible that even a Volunteer, who is exempt so far as practice with the service weapon is concerned, is liable if he uses other arms, say a match rifle, in a club competition, though membership be restricted to enrolled Volunteers. It is a situation of frequent occurrence, but I do not know that the point has ever been tested at law.

The only possible legal complication that is likely to arise is by an action to discontinue disturbance from an aggrieved neighbour; but as everyone has the right to shoot, the mere 'nuisance' arising from rifle-shooting is so trifling that little trouble need be anticipated from

occupiers living near a range, providing the arrangements for protection are adequate and the firing conducted orderly.



MORRIS TARGET.

The indoor gallery range may be as short as 5 yards, but the longer the better—25 yards is a good working distance; beyond that a protected range is preferable. The most satisfactory gallery practice — from the military point of view —is obtained from the well-known graduated targets supplied by the Morris Patent Tube Company.

These trajectory targets may be had, at from 9d. to 1s. 6d. the dozen, for 5, 10, 15, and 25 yards' distances, and they are useful for other than the service rifles, but the tubes used for adopting these regulation pattern weapons for practice with inexpensive

ammunition enable the Volunteers to become fair shots and well acquainted with the Government weapons at little cost. That is, I think, their chief advantage.

'The targets are made both in paper and steel, with movable discs, slips, and target cards for aiming drill, which represent the apparent size of the target from the firing-point for whatever range is desired, from 100 to 1300 yards. These are lowered or raised, and the aim disc altered for the different distances, as required. The slips or cards are temporarily attached by pins or otherwise to the target, at the desired elevation, so that each competitor can take away a record of his shooting. For instance, if it is placed at 10 yards from the muzzle of the rifle, and is intended to represent a distance of 500 yards, the size of the target is of one-fiftieth of the regulation target for that distance. The firer puts up his sights as for the required distance, but aims at a miniature target or bull's-eye placed at the proper distance below the target to be struck.'

For home practice any *rifled* arm is instructive, but the smooth-bore toys, called 'Saloon rifles,' for bulleted breech-caps cannot be recommended. The .22 cartridge is the smallest likely to be of real use, because ammunition that is as trustworthy as any of larger size may be obtained for it. Such a rifle may be used in a backyard or enclosed garden with perfect safety by all used to handling firearms. The penetration is slight, and a butt may be extemporised out of a box lid reared against the garden wall. To this a paper or cardboard target should be fixed, and the firing—at very close quarters—done from the prone position or the knee. The accuracy of the rifles is such that, with ordinary care, at distances up to 30 yards, there should be no shots off a target 30 inches square, even by inexperienced shots. If it is desired to make the shooting even more safe, fire from

behind a protecting screen of inch planking, which will stop any bullet accidentally discharged from the rifle.

To prevent accidents from stray bullets, an open range may be protected by impervious screens near the firing-point. If these are so numerous as to catch all bullets that would not strike the butt, the range becomes practically a closed one. In any case, the arches or screens serve as a guide to the shooter, so that practice at such a range is not the same as at an open one.

With the .303 service bullet, and all others which have a hard metal jacket, there is great liability of a ricochet missing the butt, especially at short ranges, where a low shot striking the earth at an oblique angle is almost certain to skip over the top of the highest butt and continue its course for some thousand yards or more. As even the most experienced make occasional low shots, the best safeguard is to place the target high up on the butt—8 feet at least above the level of the ground of the range, which, near the butts, should be trenched to catch low-angled bullets dropping short. If the butt is 10 feet lower than the regulation height of 45 feet above the target, it is unlikely that any experienced shot will fire over it, and, of course, ordinary high shots over the target are caught by the perpendicular butt, and do not ricochet.

A short, well-protected range for practice at short distances can be constructed without much difficulty or great expense, but if it is to be used with the service rifle and ammunition will cost more than if for ordinary target rifles, the penetration of the ser-

vice bullet being so great. To stop it, hard steel plate of at least $\frac{5}{16}$ths inch must be used; of iron or mild steel plate, $\frac{1}{2}$-inch in thickness; 27 inches of oak, or 48 of fir; 28 inches of earth, or 9 of *good* brickwork are needed to stop the bullet, and in practice it is best to exceed this minimum always. The most effectual stop is small shingle between boards, 4 inches of this is all that is necessary, and screens of this type are recommended for all closed-in and protected ranges, as they are comparatively cheap, durable, and easily obtainable. In the country a suitable site for an enclosed range should be easily procurable, and its installation a matter of no great expense. In the suburbs of large towns there should likewise be little difficulty, and, if readily accessible by train or tram, the erection of a protected range on land ripening for building might even prove an immediately remunerative speculation.

For practice in town there is nothing between the gallery range, subterranean or otherwise, suitable for Morris tube and like work, and a protected range on the housetops. This last is not a suggestion—it is a method long employed by Birmingham gunmakers. For the past quarter of a century one such range has been in daily use; for years past half-a-dozen like it have met all factory requirements, and still exist in the centre of the town, disturbing no one, and fulfilling their purpose admirably. True, these overhead ranges are only from 40 to 50 yards in length, but this is sufficient for preliminary practice, and if desired may be extended to double or treble the distance without in any way

increasing the risk. To make them safe it is necessary to wall in the firing-point, and before it for a short distance to put transverse baulks of timber, or other stops, at intervals until that point is reached, when a bullet fired from the firing-point at any angle possible would be caught by one or other of the screens or strike the butt. If lead bullets only are to be used, then ordinary baulks of squared timber will serve as a screen, and they need not be placed very close together; but a higher, narrower, shingle-stuffed screen is better, as fewer of them are required, and the top light is obstructed but very little. It is in this manner that the public and garrison ranges *in* the town of St Petersburg are constructed; it is not a costly method, and the builders of Volunteer drill halls might easily adapt their plans to allow of a good, safe practice range being erected over each building. In short, the range difficulty is not insurmountable either in town or country. To carry on my own business I needed a 40-yard range in the city, and one of 500 yards in the suburbs, and have obtained both. What a private individual can secure for his own convenience can certainly be acquired for purposes of public utility; so ranges may be had if only people really want them.

Before constructing a range a visit should be paid to Birmingham. The town is readily accessible from all parts of the United Kingdom, and the interested visitor may inspect the new rifle ranges of the Birmingham Gun Trade, 300 yards long and covered in, which are situated at Small Heath, a densely-populated suburb; the range of

the 1st Warwick Volunteers at Bournbrook—also practically within the town—which has been in use for twenty-five years or more; ranges of different construction and accommodation on the roofs of gun factories in the centre of the city; and different ranges, protected and otherwise, at the ammunition factories in the suburbs of the town, as also the testing-ground for machine-gun and quick-firing cannon cartridges at Streetley.

Asphalte, the real bituminous product of the Val de Travers—not gas tar and ashes—is one of the best substances known to stop bullets, to deaden noise and lessen vibration. It may therefore be used in protected ranges for a number of purposes, as: to bed the steel target upon, to face masonry in order to protect it from the 'splash' of lead from the target; it will prevent noise reaching those on the far side of the wall coated with it, and may be trusted to catch and stop a stray bullet, whether of lead or steel jacketed.

An efficient stop-butt is essential for all ranges, but if the natural formation of the land does not, by rising at an angle of 45° behind the target, constitute this, to scarp a hill or erect a high wall is an expensive undertaking. Far cheaper and quite as effective is a butt of boards stuffed with shingle. Strong baulks of timber will be needed to support the structure if it has to be carried to the height of 50 feet, but in any case it will be cheaper than the carting of soil or the erection of masonry. If the timber is creosoted, and the planking well tarred inside and out, it will last a very long time, and is easily repaired where shot or decayed by patching with new

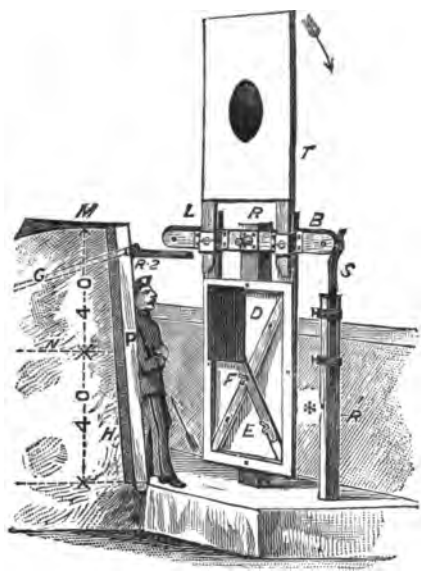
boards. A butt 2 feet thick at the base, 1 foot in the middle 20 feet of its height, and 6 inches above, will stop any modern bullet. For protected ranges and where lead bullets are used I know of nothing better than a stop-butt on the venetian-blind model. This I have used for many years. The whole is of impene-

GREENER'S BULLET CATCHER.

trable steel; the transverse plates set at an angle of 45° deflect all bullets either directly into the trough or pit below, or against the back plate first, then by it into the collecting trough. Its size and weight depend upon the class of bullet to be fired at it. Such a butt, easily removable, might also be used for ranges in marl pits, or unworked quarries, as well as in the open, as it protects adjacent masonry or buildings from injury by deflected

bullets or lead splashing, and, moreover, collects the bullets.

Messrs Kynoch make a bullet stopper of somewhat similar construction, but the impermeable stop is a vertical tube, into which, through a vertical slot, the



SERGEANT WOOD'S TARGET.

bullets are deflected by converging sides, and the spent bullets are caught in a tray or pit beneath. It is a cheap and efficient butt for practice ammunition. Paper, canvas or card targets are used with these stop-butts.

Steel targets are cheapest for lead bullets, but they will not stand repeated hammering with service bullets,

and, moreover, are liable to deflect these at dangerous angles. A canvas target is indispensable for practice with the service rifle in the open, and practice with a service rifle in a closed-in range at short distances is like using a steam hammer to crack a pea-nut—wasteful and foolish.

The canvas target should be placed 50 or more feet in front of the butt. It should descend into a 'pit' for examination by the marker, and this pit must be well protected, should be shallow, if damp is to be avoided, and well drained. Instead of a descending target on very flat or marshy ground, it is sometimes better to run the target out on rails from behind the markers' screened mantlet before the butt, and return it for examination. There are several satisfactory mechanisms for hoisting and lowering canvas targets. One should be chosen which does not require a deep pit, which puts up the dummy for signalling the value of the shot at the same time that the target is lowered, as this saves both time and labour, satisfies those at the firing-point, and may be easily adapted for working a vanishing target for rapid-firing competitions.

The targets in use by the National Rifle Association are of the following dimensions:—

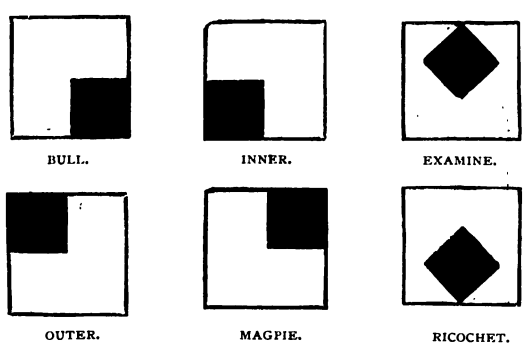
	Bull's-Eye. Diameter.	Inner. Diameter.	Magpie. Diameter.	Outer. Remainder of Target.
3rd Class	8 in.	16 in.	24 in.	4 ft. × 4 ft.
2nd ,,	2 ft.	3 ft.	4 ft.	6 ft. × 6 ft.
1st ,,	3 ft.	4½ ft.	6 ft. × 6 ft.	12 ft. × 6 ft.

The 3rd class target is used at 200 yards; the 2nd class at 500 and 600 yards; the 1st class at 800, 900

and 1000 yards, and for match rifle competitions at longer ranges.

The method of signalling the value of the shot is by placing a black panel in different positions on the dummy target. When the target is in the pit, a spotting disc—of a size distinguishable with glasses or very good sight at the firing-point—is inserted in the hole made through the canvas by the bullet. The next time the target is lowered, this disc is removed and placed in the new puncture, and the hole from which it is taken covered with a paper patch.

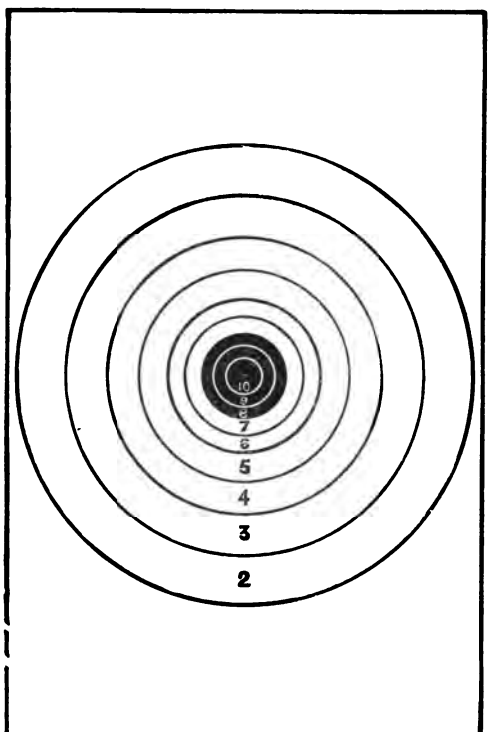
National Rifle Association System of Marking.



Where iron targets are used, the value of the shot is signalled by holding a disc against a 'dummy,' or by semaphore connected with the mantlet.

As skill is acquired by practice, if the distance cannot be increased to stop the frequency of highest possible scores, a ringed target may be used. The

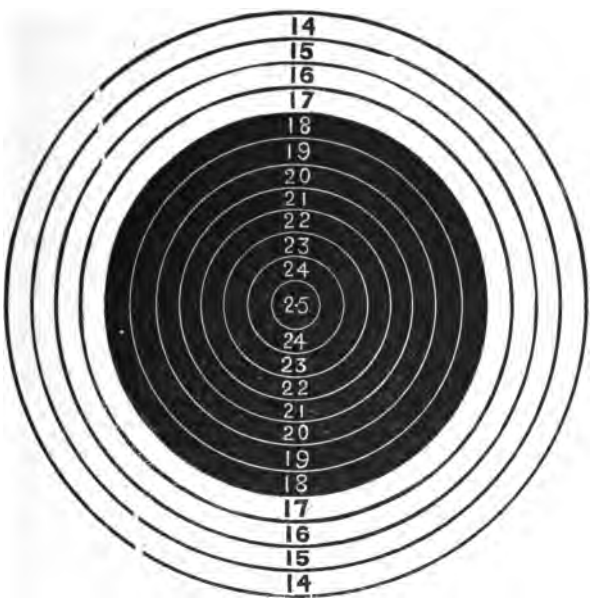
one illustrated is of the Standard American pattern. In some cases the bull's-eye is ringed still further until the actual centre is reached. This central spot,



STANDARD AMERICAN TARGET.

when struck, scores 12, the next ring 11, and then the outer rings as marked. The signalling is done by a large clock dial with one finger. This is raised

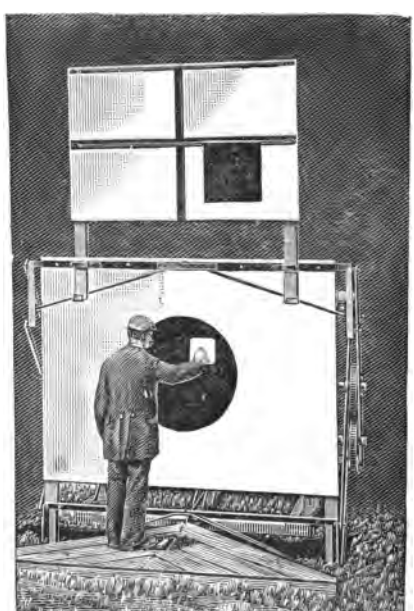
high on a staff, and suitable mechanism provided for moving the finger to any point without requiring the marker to leave the shelter of the mantlet. It is in principle the method generally adopted for target shooting on the Continent, but there, in competitions, each



GERMAN RING TARGET.

shot fires at a carton reserved to himself, and these, after firing, are collected and brought to the firing-point for examination and comparison—a plan which relieves the marker of much responsibility. The American long range, or military target, has an elliptical bull's-

eye, and in size and form is different to the targets of the N.R.A., or any in use elsewhere. It is considered an advantage from a military point of view, because the results of practice at it cannot be exactly compared with results obtained at other targets. The method, of course, has the disadvantage of its quality, since, though fine marksmanship may possibly escape the observation of foreign critics, incompetency may be screened from those friends at home as well as from enemies abroad.



RALSTON'S DUAL TARGET.

CHAPTER X

RIFLE CLUBS

EXISTING rifle clubs are for the most part used chiefly, if not solely, by past or present members of the Volunteer force. Most often the club range is that of the local Volunteers, reserved for the use of members on special days, consequently the practice is with service weapons, and under the N.R.A. rules. The competitions are arranged with a view towards helping the competitors at Bisley, or in matches with the members of similar clubs. It is clear that tuition in rifle-shooting is not intended; that it is by joining the Volunteers the would-be member qualifies most easily for admittance. To make rifle-shooting popular with the masses, what is wanted is a reversal of this order, and the establishment of rifle clubs which shall serve to attract men to the Volunteers and membership of the National Rifle Association.

The most practical method appears to be for those interested in the proposition to consult the local gun-maker in reference to the use of his range, or procuring one suitable for the practice of beginners, and to appoint him armourer—an honorary position at first. The next, to get someone to act as honorary secretary until the club

matched, and, as soon as possible, inter-club competitions. Handicap veterans and experts, and have at least one handicap open to all members without entrance fee. Do not leave men to practice simply—rather offer a prize for the best target made each month, and during the season, but not in a competition; also for the best aggregate worked out by percentage of *all* the shots fired during each week, month or season. After the first season it will be necessary to classify the members according to skill shown, and apportion the prize money so that new-comers may have a chance of winning.

Do not have anything to do with the old service Martini rifle and ammunition; it will kick the life out of beginners. Have small bore rifles, good and inexpensive ammunition—with smokeless powder where possible—and let the members see that in arms and conditions the club is truly modern. Arrange for the club to supply ammunition at low prices, and in all competitions let the entrance money include the cost of the rounds necessary to shoot it off. For this reason have many and short competitions. They keep the interest alive, and are less troublesome to decide 'on count.' Those who prefer to use their own rifles will find their own cartridges, and for the privilege forego the club ammunition; but, to all who want it, let a rack rifle and cartridges be given in exchange for the entrance fee.

Get beginners up at close range, as already recommended, and use graduated targets for practice ammunition, leading the shooter by easy stages to more difficult

shooting with 'Cadet' rifles in the open, and ultimately to qualify for membership of a club using the service rifle, and possessing a thousand yards' range. Also, as your club grows, try to arrange for the use of the nearest Government or other first-class butts by your qualified men on certain occasions. The following is the rule of the North London Rifle Club as to qualification:—

11.—All Members who have not represented a regiment in the Queen's Prize, or who have not qualified as 'marksmen,' shall be required to pass the following tests:—

With the M-L-M. Rifle, at Bisley current targets—

1. Before being allowed to shoot at 500 yards—to make with 7 rounds, any position, at 200 yards, a score of 25 points.
2. Before being allowed to shoot at 600 yards—to make with 7 rounds, any position, at 500 yards, a score of 25 points.

With the Match Rifle or M.B.L.—

To fire at 600 yards and satisfy the Executive Officer that he has a knowledge of the Rifle.

So far as the club's facilities allow, direct the practice towards securing this qualification for every active member; consequently frame the rules for firing upon those of this or similar clubs, and the conditions of the National Rifle Association, a copy of which last can be had on application to the Secretary at 12 Pall Mall East, London, S.W.

The number of the prizes is of more importance than the value; honour even the best shot of the day's contest, and at once place his name on the list of the members from whom the team to represent the club in

inter-association matches is to be chosen. This is preferable to a competition to decide who will be sent to represent the club on each given occasion. The man whose name has most frequently appeared in the register as the best shot of the day should be the first asked.

Do not worry men to join the Volunteers, or allow active recruiting for the army, Militia, or even the N.R.A.; if any man is as much taken up with rifle-shooting as he ought to be he will want to visit Bisley. If he has any fancy for the service he will join without pushing, and it is only such men who are really useful there in times of peace. If he is not enamoured of drill, parade and camp, he will not like them the better for being badgered, and may take offence, leave the club and forego the sport. If the instructor is an army man, or veteran Volunteer, his talk will be all that is needed to decide the shooter, and a club might not be popular with the public if parents thought their sons, by joining it, would be pressed to 'enlist with the colours.'

Try to get as members ex-Volunteers; they may still like shooting, though home duties and civic dignity prevent them remaining in the force as privates, and not all have money or time to be officers, even if qualified. Their presence, their talk, their manner, will encourage the younger members; their enthusiasm, example and confidence may help not only the club, but the Volunteers and army too. Particularly, if in your district there is a 'green ribbon' man, don't rest

until he has consented to become an honorary member, and when he visits the firing-point do him all honour and make him most welcome. Attention to such matters as these will have far greater influence with young members than any wordy argument or oft-repeated advice to join the service.

As elsewhere stated, if kept as a private gathering—admission reserved to members and invited friends—the shooting may even now be done without members infringing the Gun Licence Act. For this reason let the 'armourer' deal with the rifles, bringing them to the ground, examining and cleaning them after firing, and storing them until the next meeting. Get an indefatigable secretary and use him well, and whenever there is anything of interest do not forget the local paper. Its editor will then be always ready to reciprocate in advancing the welfare of the club and its members.

CHAPTER XI

COMPETITIONS

It has been said that the rifleman's best competitor is the target. It is true that this competitor is the most persistent and the hardest to beat, but the contest with his inanimate opponent increases in interest after living competitors have been excelled. The Alexander who has no fresh foes to vanquish directs his rifle to this old enemy with greater zest each time, and finds the battle yearly growing in excitement; but the beginner needs to be encouraged by competing against something easier.

I have already insisted upon the value of direct competition as an incentive to thoughtful, steady, and therefore useful and good shooting; I wish now just as emphatically to insist upon competition as the best training possible for the man. Rifle-shooting, better than other sports, nurses and brings out the most valuable qualities of the man, and I believe that no shooter rises from the firing-point after shooting off a closely-contested tie but is improved by the ordeal. That he has a more worthy confidence in himself and greater admiration for the man against whose score he

has struggled—mayhap in vain. This being my opinion, I am the more ready to endorse that of the veteran shot and well-known writer, 'A Marksman,' who declares that 'the man who *can* hit the target is a more useful citizen than he who can *not*, and he deserves more encouragement than he gets.' As for the intrinsic value of the prizes, he is indeed a poor rifleman who places that before the honour of the win or the sport of the contest. 'Pot-hunting' has fewer attractions for the rifle shot than for any other sportsman; the term 'pot-hunter' is the cheap sneer of the incompetent, the worthless clap-trap of the stickler for pipe-clay and 'discipline.' All the expert rifleman wishes, beyond the pleasure and honour that comes from winning, is a visible memento of the occasion—some *thing* that shall recall to memory frequently the thrill of pleasure he felt when he won *it*. He who wins the Queen's Prize and £250 knows well what it has cost—the value of the prize is to him vastly enhanced by knowing that money alone could not buy it, and that many men would give their thousands in order to have what his intelligence, skill and luck have brought him.

If there is competition the prize need not be costly; sometimes it is made only the entrance to competitions of wider interest—when it is the *only* way of obtaining an entry that is coveted, never doubt but it will be striven for keenly. This is practically the usual plan adopted by Volunteer companies in deciding the company's delegate for the Queen's and St George's at Bisley.

As there is a time limit for the shots fired in the chief competitions, the same rule should be applied to smaller contests for all but those restricted to beginners. Quick aiming as well as accurate shooting is required of a marksman; he must be able to decide definitely and at once—the man who can do so, and do so rightly, is, undoubtedly, a better man than he who unduly hesitates.

Too much attention cannot be given to adequate preparation at home. Let the sights be blacked, the pencil sharpened, the score book referred to, and the weather conditions noticed *before* reaching the range. On the way thither think out what it is best to do; as wind allowance, higher or lower than usual elevation, etc., and take care to arrive in good time—but do not hurry. There is nothing to be gained by 'dawdling,' but it is certain that, if hurried beyond the usual pace, worse shooting will result. Therefore be in time. Enter for all the competitions you can and shoot all you can. Have patience; do not get flurried; be observant of what does concern you—changes in wind and light—but do not heed the scores of other competitors, the interest of which to you is likely to be the more remote the more you consider them. If the man with whom you are squadded to fire at the same target makes bulls regularly, and you cannot find the bull's-eye, do your best and keep your temper. After the shooting is over he may then tell you how he did it, and the information will serve you another time. If you do anything that is likely to disturb him he most

surely will not, though he may be tempted to lead you still further astray. It is better to be observant and notice what the man does rather than pay attention to what he says. When team-shooting, be guided by the coach so far as his indications correspond with your own experience, and tell him all he wishes to know or is likely to be of use to your team. Particularly must you do so, if any peculiarity in your rifle, or in your own way of handling it, if followed by others, is likely to lead them astray even for a moment. Remember, for the little you give, you receive back as manyfold as there are other members in the team, and if you can hang well together all through the contest you may be better as a team than if you, or anyone of the others, shot brilliantly only sometimes.

The rule of competitions is that in appraising the quality of the shooting between men who have made an equal score, the one who loses the bull's-eye is reckoned the worse shot than he who finds it later and holds to it. Thus a score of 3, 4, 4, 5, 5, 5, 5 = 31 is better than 3, 4, 5, 5, 5, 5, 4 = 31 so far as place goes. Therefore, having once got the bull's-eye, by no means fall away. The way to hold it is to fire each shot so as to remember exactly how it was fired—in order that the next shot may be fired the same—if right; and certainly otherwise if *not* right.

At the present time the rules of rifle-shooting competitions are practically settled by the conditions imposed upon members of the National Rifle Association for the annual competitions at Bisley. This Society was founded

by some of the more influential leaders of the Volunteer movement of 1859, by amalgamation with the Council of the London Rifle Brigade. Its purpose is 'to give permanence to Volunteer corps, and to encourage rifle-shooting throughout the Queen's dominions.' The first meeting was held on Wimbledon Common on June 1860, and opened by Her Majesty the Queen scoring a bull's-eye with a Whitworth rifle fired from a rest. It was intended to hold the following meetings in different parts of the United Kingdom, but that part of the scheme was abandoned. Another object of the promoters was to encourage the art of gun-making and science of gunnery, by using only the best shooting rifles obtainable for the last stage of the principal prize —that, too, has been abandoned. Then the Prince Consort offered a prize annually until his death for the best shooting in an any rifle competition open to the world. This has now been continued as the Albert, and restricted in different ways. Little by little the truly military element obtained ascendency, and ultimately the National Rifle Association meeting became little more than a gathering of Volunteer delegates and competitions with the service rifle. There are open competitions, as specified in the Appendix *A*, but from the original purpose the Association has widely departed, though its work is, of course, not only useful but important, since it is only by the interest taken in rifle-shooting that the Volunteer force is held together in the times of peace. Its fault is its want of elasticity. Military sights, military positions, military discipline—

in all things it is military but the shooting—which is far ahead of the army average.

At the earlier meetings, Swiss and Belgian marksmen used to compete, but the conditions were so altered that they stood no chance, and consequently valuable to England as some knowledge of the average continental marksmanship and style of rifle-shooting might be, we have missed the opportunity we might have secured of seeing its development year by year in competition side by side with the best of our own producing.

Again, competitions like the *Owl*, which was fired at night, the bull's-eye a lantern, might have been developed, as they had practical military utility. Now, competitions at moving targets are mostly contested by sportsmen, not by the Volunteers—as military units.

For the ordinary competitions there are practically but two classes of rifle available. The 'Any Military Breech-loader' and the regulation 'Service' rifle. The former must now not be of larger calibre than .315, the weight not over 10 lbs., the sights of any pattern other than telescopic. Open sights are admissible, but are not used, as aperture sights with wind-gauges and spirit-level allow of better definition, uniform results, and accuracy. The ranges are from 800 to 1100 yards.

The 'Service' rifle is the .303 of infantry pattern—the minimum pull of trigger must be 6 lbs.; the sights may be painted black or white, but the paints not so mixed as to make a grey. Wind-lines may be drawn on the sight, but a bar capable of lateral adjustment is not allowed.

There are four first-class competitions for the 'Any Military Breech-loader' open to all comers, these added together form the 'All-comers' Aggregate,' for which prizes are given; the Queen's, St George's, and the Alexandra make the 'Volunteer Aggregate'—the two series together form the 'Grand Aggregate,' for which prizes are given, and can of course be won only by Volunteers, since they alone may enter for the restricted competitions which constitute nearly half the score. There are also competitions open to all Her Majesty's forces, numerous pools, and fancy competitions.

It will not do for the National Rifle Association to rest upon its past achievements; of that the council is fully aware. Its recently-issued circular to influential parties with reference to the formation of rifle clubs has not brought many encouraging answers. There is a decided objection to any charge being made upon local rates for ranges or instruction; and some people think that persons who wish to shoot with the rifle ought to join the Volunteers. The committee of the N.R.A. agree that the charge should be upon the National Exchequer and not the local rates, and, with regard to the other objection, think that the encouragement of rifle shooting would tend rather to swell than deplete the ranks of the Volunteers, because at the present time officers find difficulty in getting a large proportion of their men to fire at the ranges even to make themselves efficient.

The committee believe the insuperable difficulties existing to be—the gun licence, want of ranges, ex-

penses of rifles and ammunition. Now, if ever, is the time they should call upon the Association to exert its full strength towards overcoming such obstacles. Also they must obtain relief for their own meeting. Already the Volunteers grumble at its cost, and particularly that not even the entrance fees are returned in prizes, but only a portion of the sum so taken. In this the Volunteers have less cause for complaint than competitors with sporting and 'any' rifles. Last meeting the prizes given were 3879, of a total value of £11,899, 17s. 9d., of which the N.R.A. contributed 3584, of the value of £9682, 14s. 5d.; the total entrance fees came to £12,951, 12s. 2d.; the subscriptions to £1055, but the expenses of the Bisley meeting are over £3258, and permanent disbursements there £1134, in addition to the establishment charges of the London office, £1299. There are practically but six competitions for sporting rifles, and the prizes, with the exception of £47, are contributed by special donors, yet the entrance fees alone amounted to £138, 18s., showing a gain of £91, 18s. to the Association for its £47 prize money. For the match or any military breech-loader, there were twelve competitions, and here again the entrance fees, £587, 1s. 6d., are out of all proportion to the value of the prizes given by the Association, namely, £308, 10s. 2d. The meeting, therefore, being so wholly a gathering for encouraging efficiency with the service rifle, a grant in aid ought to be forthcoming from the National Exchequer, and, failing this, the Association should attempt to dispose of Bisley Camp to

the Government, and merely obtain the right to free use of it for the annual meeting. The Government should defray all expenses of markers, etc., and leave the receipts of the Association practically intact for prize money, and setting it free to encourage rifle-shooting throughout the United Kingdom in other ways than by the one attraction—the annual meeting. Unless something of this kind is done, the Association may lose much of the support it has hitherto had from the Volunteers, especially those in distant parts of the United Kingdom. Already north of the Tweed the Scotch Twenty Club practically threatens its supremacy there. The Association should so reorganise as to maintain its position, and also be free to encourage elementary practice with the rifle—a form of sport which, by kindly nursing, may be developed into a strong weapon for national defence.

Already foreign powers are awake to the possibilities of the rifleman, as demonstrated by the achievements of the Boers. The French Rifle Club Union is urging all Frenchmen to make themselves expert in the use of the rifle, and in Holland an association has been founded to popularise rifle-shooting among both men and women in order to 'maintain the independence of the Netherlands.' In Norway, if accounts are to be believed, all able men have for some time past been practising continuously at the one form of sport which is of national utility.

APPENDICES

A

NATIONAL RIFLE ASSOCIATION

The objects of the National Rifle Association are the promotion and encouragement of Rifle-Shooting throughout the Queen's dominions, and to give permanence to the Volunteer Force.

Membership.—Donation of £10, 10s. constitutes donor a Life Member; an annual subscription, due on January 1, entitles subscriber to all rights of membership for the current year. Half-fees only are payable by any member of Her Majesty's Forces actually serving.

Privileges of Members include right of admission to Bisley Camp and Members' Club during the annual meeting. To shoot for the Association Cups and Ladies' Prizes, and a lady member may nominate a gentleman, being a member, to shoot for such prizes.

GENERAL REGULATIONS

1. No Member of the Permanent Staff attached to a Volunteer Corps shall be eligible to shoot for Prizes restricted to Volunteers.

2. No Volunteer shall be eligible to shoot as a member of more than one Corps at any Meeting of the Association.

3. No Officer, Non-Commissioned Officer, or Private, detailed for duty at the firing-points or in the butts during the Meeting, shall shoot either for a prize or for practice during the time for which he is detailed for duty.

4. In all competitions restricted to Volunteers, or in which they shoot as such, *except H.R.H. The Prince of Wales's Prize*, the uniform of their Corps shall be worn so far as specified each year—usually undress uniform.

5. All protests or complaints arising at a firing-point must be

made in writing, and, if possible, handed in *at once* to the Officer in charge.

6. Competitors shall submit their rifles or revolvers and ammunition for inspection whenever required. The decision of two Range Officers on the spot when testing the pull-off of a trigger shall be final.

7. No competitor may load until he has taken up his position at the firing-point.

8. In firing at the Running Deer or Man, the rifle must not be raised to the shoulder before the Deer or Man appears from behind the screen, otherwise the shot will be disallowed.

9. No rifle may be cleaned or wiped out between the shots fired with it at any single distance of a competition.

10. Except when otherwise specified in the Conditions, one Sighting Shot must be taken at each distance, and also before resuming firing when the competitor's firing at any distance has been interrupted by Gun Fire. Before commencing to fire off a tie, a competitor may take a Sighting Shot, if he has previously notified to the Range Officer his desire to do so.

11. Slings may be used as an assistance in shooting for all prizes; but where the competition is restricted to military breech-loaders the sling must be of the Government length and pattern and attached to the rifle as in Government arms. The greatest length of a Government sling is 54¼ inches, not including the tongue, or the buckle.

12. In individual competitions a competitor may use a binocular or telescope, *not mounted on any kind of stand*, provided his doing so does not delay the shooting.

13. The use of orthoptics will be allowed in all Competitions, subject to the following conditions:—

(*a.*) The sight of the eye not used for aiming must not be artificially blocked.

(*b.*) The field of vision must not be limited, except by the orthoptic disc. Opaque goggles, side flaps, etc., will not be allowed.

(*c.*) No glass darker than a medium tint (about that known to opticians as No. 6) may be used over either eye.

14. No person except the Register Keeper shall be permitted to speak to a competitor after he has taken his place at the firing-point.

Any violation of this rule, or of any part of it, shall be at once reported by the Register Keeper to the Range Officer, who shall caution the offender, and on any repetition of the offence shall report

the same to the Bisley Committee, who will deal with the case as laid down in the regulations under the head of penalties, and may remove from the ground any person advising a competitor.

Conditions of Shooting

(*Generally applicable to all contests*)

1. Competitors must be present at their firing-points punctually at the time detailed on their tickets, otherwise they will not be allowed to shoot.

2. All preliminaries must be completed beforehand, and will not be allowed as excuses for delay.

3. The score of any competitor or team reported by the Range Officer for undue delay in firing or in commencing to fire may be disallowed. Such delay shall, after a competitor has commenced, be interpreted as being one minute from the time at which the target was clear. Adjustment or colouring of sights will not be allowed as a cause of delay.

4. When once a competitor has taken up his position for firing, he shall not quit the firing-point before he has either retired from the competition or has completed his firing, but leave may be given by the Range Officer to any competitor who may find it necessary, by reason of a mishap to his rifle or ammunition, to fall out for the purpose of rectifying it.

5. No two competitors detailed to fire at the same time shall shoot with the same rifle; nor shall a competitor change his rifle during his firing at any single distance of a competition, unless his first rifle shall become unserviceable through an accident, which must be verified by the Range Officer; nor shall a competitor convert his rifle from the 'A.R.' Class to the 'M.B.L.' Class, or *vice versâ*, during his firing at any single distance in a competition.

6. Except in second and later Stages, competitors shall when possible be formed up in pairs or in threes and fire shot for shot in turn.

7. In second and later Stages, the competitors shall be formed in squads, and fire shot for shot in the order in which their names are called.

8. Where but one competitor is present he shall fire his shots without undue delay, but the Range Officer, *or some person named by him*, must witness the shooting and sign his name as testifying to the correctness of the score, which will otherwise be invalidated.

9. At Pool, competitors, when more than one are present, must fire in turn, but may fire two shots before quitting the firing-point.

10. At the 'Martin Smith,' and in Prizes shot for at the Running Deer or Running Man, no competitor shall compete twice consecutively if any other competitor is ready to shoot.

11. Competitors should, after delivering *each shot*, pay attention to the score called out by the register keeper. No objection to the score recorded on the register ticket will be entertained unless made before it has been checked by the Range Officer.

Ties.—In most competitions are counted out by taking range totals in order of distance, commencing with the longest; by fewest outers, by fewest magpies, by fewest inners, *by the value of each shot in inverse order*, as a last resource, by shooting off, always this last in case of *absolute ties.*

Penalties

Any competitor is disqualified by any action which tends to unfairness or disorder. In addition to ordinary misconduct, it is also provided that *intentional* shooting at a wrong target shall disqualify.

Competitors who are excluded from further competitions are these:—

(*a.*) Who shall fire when the danger signal is up; or

(*b.*) Who shall discharge a rifle within the enclosure, except in accordance with the regulations for shooting; or

(*c.*) Who shall be found with a loaded rifle, except at his firing-point and within the hours of shooting; or

(*d.*) Who shall discharge his rifle accidentally, either by his own want of care, or by reason of any defect in the rifle; or

(*e.*) Who shall fire a Pool or Running Deer shot before delivering his ticket to the Non-Commissioned Officer in charge; or

(*f.*) Who shall use a dummy cartridge within the limits of the Camp; or

(*g.*) Who shall act in any way that might prove dangerous; or

(*h.*) Who shall refuse to comply with any order that may be given by the Officer in charge of the firing-point to which he is detailed; or

(*i.*) Who, when competing in a competition in which 'coaching' is not permitted, shall give to or receive from any other person any assistance or advice of the nature of 'coaching'; or

(*k.*) Who shall be guilty of any breach of discipline in or about the Camp,

shall, upon the occurrence being proved to the satisfaction of the Bisley Committee, forfeit every prize won by him since the occurrence, be excluded from all further competition at the meeting, and shall forfeit all his entrance fees.

Disallowance of Score.—3. Any competitor—

(*a.*) Who shall fail to comply with the conditions laid down for any particular Prize; or

(*b.*) Who shall infringe any of the instructions and regulations for the conduct of the Meeting while shooting for any particular Prize; or

(*c.*) Who, when competing for an Aggregate Prize, shall enter incorrectly his previous score or scores on the register or ticket provided for the purpose,

shall, on the occurrence being proved to the satisfaction of the Bisley Committee, have his score in that competition disallowed.

Fines.—4. Any competitor—

(*a.*) Who, after taking up his position for shooting, and in proceeding to adjust his sights or change his position, shall not hold his rifle vertically or with the muzzle towards the target; or

(*b.*) Who shall fire at the Running Deer or Running Man, except when it is running between the danger POSTS; or

(*c.*) Who, in competing for an Aggregate Prize, shall fail to enter or shall enter otherwise than legibly in ink his previous score or scores on the register or ticket provided for that purpose, or shall fail to carry out such directions as may be laid down for handing in his aggregate ticket,

shall be fined ten shillings, and in the case of (*c.*) shall not be entitled to be included in the Prize List if the mistake is brought to notice after the Prize List has been posted up.

(*d.*) Any competitor who shall accidentally fire at or hit the wrong target

shall be fined 2s. 6d.

(*e.*) Any competitor who shall hit the 'Haunch' at the Running Deer target

shall be fined one shilling.

NOTE.—All scores made by a competitor by whom a fine has been incurred and remains unpaid shall be disallowed.

In cases where a competitor is 'excluded from further competition,' or where his 'score is disallowed' for any particular Prize, the *circumstances only* under which the penalty was incurred shall be

posted on the Board, as a warning to others, without the NAME of the individual implicated.

In cases of 'disqualification' under Clause 1 of this Section the NAME of the offender, as well as the particulars of the case, shall be posted on the Notice Board.

Mitigation of Penalties.—5. It shall be in the power of the Bisley Committee to mitigate, vary, or remit any Penalty in any particular instance that may appear to them to be exceptional.

SCORING

Challenging the marking.—3. The marking may be challenged on the deposit of the sum of *half-a-crown*, which shall be handed to the Range Officer. If the marking in question is confirmed from the Target, the half-crown shall be forfeited without appeal; if, on the contrary, the objection proves well founded, the half-crown shall be returned to the competitor who has paid it, and the score altered in accordance with the decision received.

4. If on a target being raised the *spotting-disc* should appear to unmistakably disagree with the value shown upon the dummy, the Register Keeper shall stop the firing at the target, and shall report the circumstance to the Range Officer, who shall decide the value of the shot, using the telephone if he think it necessary, but without requiring a deposit from the competitor, and from his decision there shall be no appeal.

5. Should firing have been suspended for any reason at any target, the markers in the butt must be warned by means of the telephone before the firing is resumed.

6. Though the Council will use their best endeavours to secure telephonic communication with the butts, they will not be answerable for the result of any breakdown in the arrangements, whether of a temporary or of a permanent nature. Such occurrence must not be allowed to interrupt the shooting, nor will it be admitted as a claim on the part of a competitor to any indulgence.

7. When two shots strike the target simultaneously, that alone which has the *higher* value will be marked on the dummy, and the competitor whose proper turn it was to fire at that target will be credited with that value. *Both hits will, however, be shown by spotting-discs.*

8. If two competitors fire simultaneously at a target, the competitor who fires out of his proper turn will be credited with a miss.

9. If, at the moment at which a competitor fires, his target should be lowered in such manner as to falsify the result of his shot, the Range Officer is empowered to cancel the result of such shot, and to permit the competitor to fire another shot in place of it.

RIFLES

Class I.—Service Rifles.—Martini-Henry as is used by the Government (obsolete), Lee-Metford and Lee-Enfield.

As issued by the Government, or of *bonâ-fide* Government pattern and bearing the Government Viewer's mark. When of private manufacture the following dimensions must be strictly adhered to :—

1. WEIGHT—Including cleaning rod, oil bottle, pull through and magazine—not to exceed Mark I., 9 lbs. 10 ozs., Mark II., 9 lbs. 4 ozs.

2. LENGTH—*Maximum*, measured from the muzzle to the butt when placed vertically on the ground 49½ inches.

3. STOCKS—Must not be chequered.

4. PULL OF TRIGGER—Minimum, 6 lbs.

5. SIGHTS—Strictly in accordance with those of the Government Lee-Metford. The match slide may be used unless excepted by the conditions of shooting. Filing any of the sights will not be allowed. The V of the back-sight must be 'eyeably' in the centre. The bar must not be capable of sliding laterally as a wind-gauge.

Class II.—M.B.L.—Any Military Breech-loaders (including LEE-METFORDS *of* bonâ-fide *Government pattern as above, and other* MILITARY BREECH-LOADERS *not of Government pattern, but complying with the following conditions :—*

When of British make, to bear proof-marks both on barrel and breech.

To be fitted with an arrangement for fixing sword or other bayonet.

1. WEIGHT—Maximum, 10 lbs. with or without magazine.

2. LENGTH—Extreme length from 48 in. to 52 in.

3. CALIBRE—Maximum, .315 in.

4. STOCK—Sufficiently strong for service purposes, and fitted with swivels for a sling.

5. PULL OF TRIGGER—Minimum, 6 lbs.

6. SIGHTS :—

Back-sight.

(*a.*) To be attached to the barrel in front of the lock.

(*b.*) The sight may be moveable in the following respects only :—A hinge allowing the flap to be brought to a vertical position and to be lowered to the barrel forwards or backwards at pleasure ; a horizontal bar capable of sliding vertically up and down the flap ; a piece of metal composing the actual sight, fitted to the sliding bar and capable of sliding thereon horizontally as a wind-gauge. No screws, racks, or other mechanical appliances may form part of the sight for the purpose of moving either the wind-gauge or elevation.

(*c.*) The graduations measuring the elevation must be on the flap only ; those for elevation and wind-gauge must severally consist of a single scale only, not of a vernier or double scale.

(*d.*) The width of the flap or leaf must not exceed *one inch.*

(*e.*) The construction of the back-sight must be such as in the opinion of the Council or Bisley Committee would be suitable for use in actual service.

(*f.*) The sight itself must be an open notch or a plain bar furnished with one or more vertical lines.

(*g.*) A spirit level may be attached to the back-sight or back-sight bed.

Fore-sight.

To be of the Government pattern called 'Barley-corn.'

NOTE.—Any pattern of sight not strictly conforming to the above regulations must receive the sanction of the Council or Bisley Committee before it may be used.

Regulations applicable to rifles in Classes I. and II. :—

1. STOCK—No pad or shoe for the heel-plate of the butt will be allowed.

2. SIGHTS :—

The only colours allowed on the sights are *black* or *white*, or *black* and *white*, but *not* mixed so as to produce *grey*. No appliance may be affixed for the purpose of shading the sights.

Back-sight.

(*a.*) may be tilted forward or backward, and may be

supported at the necessary angle by any extemporised means.

(*b.*) The sliding bar may be reversed, and may be used on either side of the uprights. Marks or lines of any kind, removable at pleasure, but not consisting of slips of paper or other substance capable of being shifted, may be used. Detached 'verniers' or 'sight elevators' may be used.

Class III.—Any Rifles.—Maximum weight, 10 lbs.

STOCK—A pad or shoe for heel-plate of the butt may be used, but for the purposes of weight and measurement it will be held to be a part of the rifle.

PULL OF TRIGGER—Minimum, 5 lbs.

SIGHTS—Of any description, *except* telescope and magnifying sights.

N.B.—Any rifle whatever coming within the above conditions may be used in 'Any Rifle' competitions.

Class IV.—Sporting Rifle, including LEE-METFORD, LEE-ENFIELD *and* MARTINI-HENRY *rifles of a* bonâ-fide *Government pattern, and other rifles complying with the following:-*

CALIBRE—Any, subject to the conditions as to charge laid down in Section IX., par. 3.*

PULL OF TRIGGER—Minimum, 3 lbs.

SIGHTS—Open sights, or such as have received the sanction of the Council, Lyman back-sight and Beach combination fore-sight allowed. No lateral adjustment of fore or back-sight will be permitted. The centre of both sights must be fixed over the centre of the barrel. If a platinum or other line is used in the back-sight, only one such line will be permitted. Spirit levels are allowed.

* Section IX.—*Ammunition.*

1. M.H and L.M.—No ammunition but that issued by the N.R.A. at the firing-point shall be allowed.

2. M.B.L.—Maximum length of cartridge, 3.15. Maximum diameter of cartridge at base, excluding rim, .49. Maximum weight of bullet, 217 grains.

3. SPOR.—Minimum charge, 50 grains black powder, or its equivalent as regards muzzle velocity when other powders are used.

N.B.—No ammunition of a dangerous character may be used. In

all cases of accident arising from defective ammunition other than that provided by the Association, the user only shall be held responsible.

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In the All Comers' series, there are now usually about six competitions with sporting rifles, and the prize money given by the N.R.A. amounted last year to £47; for match rifles, twelve competitions and the added money, £308, 10s. 2d.; for service rifles over seventy competitions; in each case in addition to 'pools.'

B

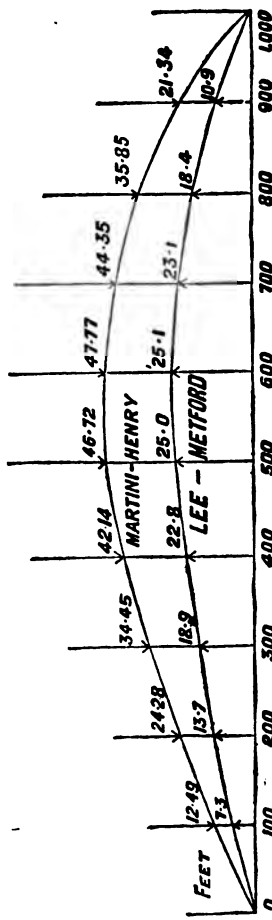

DIAGRAM OF COMPARATIVE TRAJECTORIES OF THE MARTINI-HENRY AND THE LEE-METFORD.

C

WIND ALLOWANCE FOR .303 RIFLES

FORCE OF WIND.		RANGE IN YARDS.	DIRECTION OF WIND—O'CLOCK. 1	2	3	4	5	7	8	9	10	11
	G	200	1	2	3	2	1	1	2	3	2	1
	E	500	4	8	10	8	4	3	7	9	6	3
4	N	600	7	16	18	15	6	6	12	16	14	6
miles	T	800	12	32	37	30	11	11	26	34	30	11
per hour.	L	900	20	41	53	40	19	18	39	50	40	19
	E	1000	30	52	64	50	28	27	49	60	50	29
	M											
	O	200	2	5	6	5	2	2	5	6	5	2
	D	500	10	20	22	19	9	8	18	22	18	9
10	E	600	20	30	33	29	19	18	27	32	29	18
miles	R	800	30	43	46	42	29	28	40	44	42	28
per hour.	A	900	45	50	55	50	43	41	50	54	50	42
	T	1000	60	65	70	63	58	56	62	68	63	55
	E											
	B	200	3	6	7	6	3	3	6	7	6	3
	R	500	18	28	34	26	18	17	25	33	27	17
18	E	600	30	50	56	48	30	28	47	52	48	28
miles	E	800	56	90	105	88	55	52	86	100	88	54
per hour.	Z	900	70	130	155	135	68	66	123	150	127	68
	E	1000	90	155	190	150	87	85	148	185	152	87
	S	200	5	9	12	8	5	4	7	11	8	4
	T	500	25	45	60	45	24	24	40	58	42	24
26	R	600	35	68	100	65	34	33	63	95	65	33
miles	O	800	68	130	165	125	69	65	120	160	128	64
per hour.	N	900	85	168	200	160	85	83	152	190	165	82
	G	1000	110	215	245	210	110	105	205	230	210	105
		200	7	12	15	12	7	7	11	14	11	7
	G	500	35	65	90	65	33	33	60	85	60	33
36	A	600	50	95	125	90	50	48	70	118	90	48
miles	L	800	95	180	210	170	90	88	165	205	170	90
per hour.	E	900	120	240	280	230	120	115	225	270	225	115
		1000	160	290	370	285	150	145	285	360	285	105

For six and twelve o'clock winds correct elevation only.

The figures in the above table represent inches on the target.

D

ALLOWANCES TO BE MADE WHEN SIGHTING

Elevation.—Remember that one 150th on the vernier is equal to a minute of angle (nearly), and gives *one inch* on the target at 100 yards; 2 inches at 200 yards; 5 inches at 500 yards; 10 inches at 1000, and so on. Ascertain *your* zero from the slide bar at 500 yards, and, normally, add:—

10	150ths	for	600	from	500	add	10.
21	150ths	for	700	from	600	,,	11.
33	150ths	for	800	from	700	,,	12.
55	150ths	for	900	from	800	,,	13.
69	150ths	for	1000	from	900	,,	14.
75	150ths	for	1100	from	1000	,,	16.

But differences in temperature and light will necessitate a difference in elevation, and wind also according to strength and direction, *in addition to lateral allowance* on the bar.

For twelve o'clock wind *add*, 150ths, as below:—

	500 and 600 yards.	800 and 900 yards.	1000 yards.
Gentle,	normal	1	2
Moderate,	1	2	3
Breeze,	2	3	4
Strong,	3	4	5
Gale,	4	5	7

For six o'clock winds *deduct* 150ths as above.

For winds one to three, and nine to eleven, add for strong breeze in proportion; and for winds four and five, and seven and eight, deduct in proportion, if strong. At long ranges do not scruple to make ample *lateral* allowance. At long ranges it is more common to under-estimate the force than overrate, except in stormy weather.

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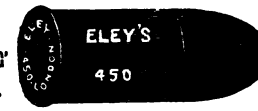

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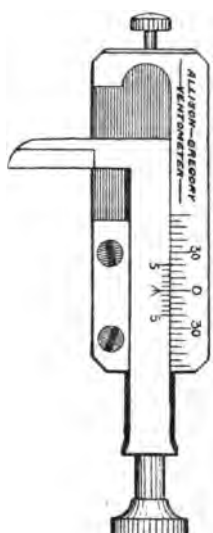

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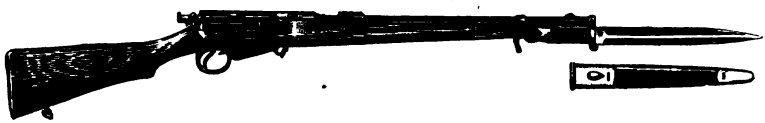

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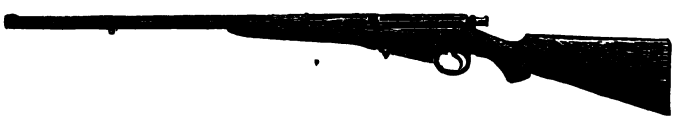

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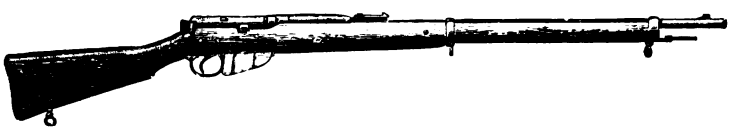

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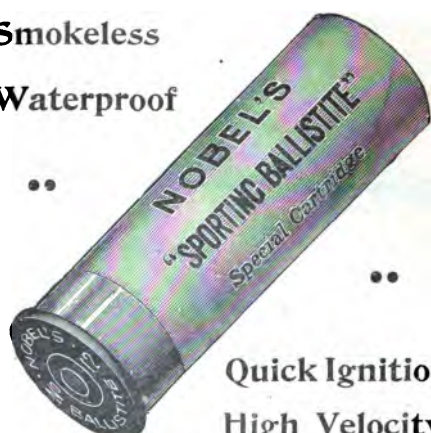

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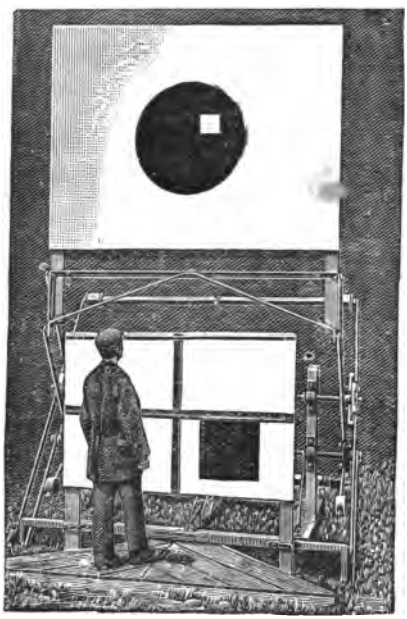

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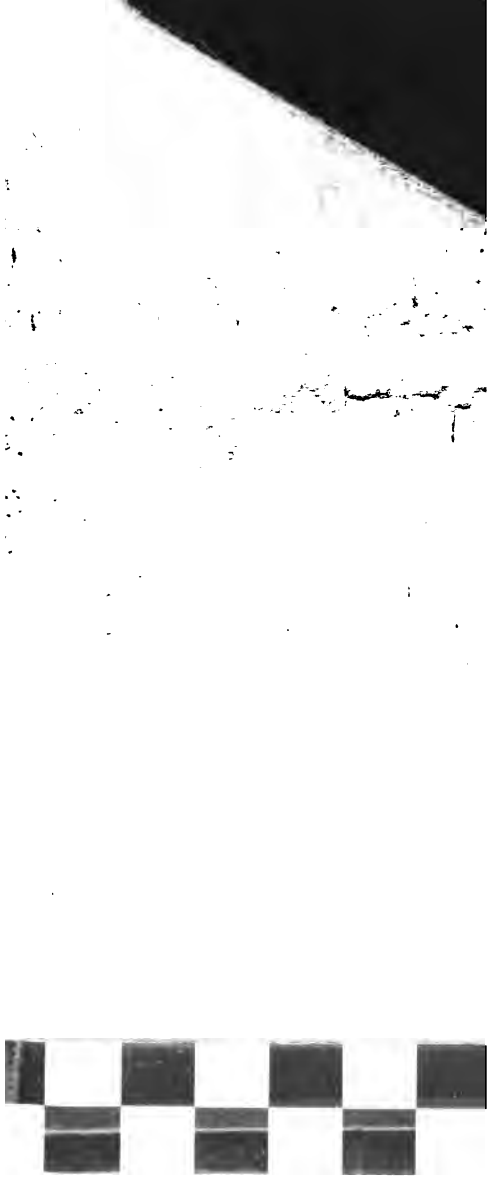
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